Tri-Services A/E/C CADD Standards Workspace Instructor's Course Guide

For MicroStation

Developed For

US Army Corps of Engineers

Tri-Services A/E/C CADD Standards Workspace

Instructor Welcome

Welcome to the Tri-Services A/E/C CADD Standards Workspace training guide. This 8 hour class is a fast paced course designed to explore the new features of the workspace designed around the A/E/C CADD Standards.

Course Flow

Typically some students move at a pace quicker than that of the rest of the class, some slower. The materials provided can help keep the group together. In the case of a "quick learner", exercises you would ordinarily skip over should be assigned to that student. If you have a few individuals who are slower on the uptake, letting the majority of the class perform various exercises in a self-tutorial mode will give you the opportunity to spend time with these students.

Instructor's Notes

Instructor's notes are provided throughout the course guide. These notes are bold and italicized. The student's version of the course guide does not have these notes. They are provided with an area that can be used for their personal notes.

Installing the Support Files

This course is supported by a number of design files and a few miscellaneous files. To prepare to teach this course you need to create a training directory to receive these files. We recommend TSWS in the root directory. Copy the self-extracting file tsws.exe to the training directory and type "tsws" to extract the files.

Tri-Services A/E/C CADD Standards Workspace Table of Contents

Introduction

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In August of 1995, the Tri-Services CADD/GIS Technology Center released the first draft of the A/E/C CADD Standards. These standards contained detailed information on the setup and organization of CADD construction drawings. A MicroStation workspace was later developed to reflect version 1.7 of the A/E/C CADD Standards. This Course Guide is designed to aid in the instruction of the proper techniques for using the workspace.

[Instructor – Chapter 1 is an "introduction" to the class and manual. Use this time to explain the class and expectations.]

Before We Begin

Since the Tri-Services Workspace is an extension of MicroStation, a basic working knowledge of MicroStation is necessary before starting this course. The following topics should be clearly understood before learning the new workspace.

- Working with Design Files

- Viewing Designs

- Basic 2-D Drafting Skills which include:

  - Placing Elements

  - Working with AccuDraw in 2-D

  - Manipulating and modifying Elements

  - Working with Cells

  - Annotating Drawings

Installed Software

In order to start this course, the following software products should already be installed and operational on the students' computers:

- MicroStation SE (Version 05.07.00.41 or later)
- Tri-Services Workspace (Version 1.7 or later)
- Microsoft Access 97

Notes: *[Instructor – Microsoft Access 97 is needed by the checker to record the checking activities. This should NOT be discussed as a classroom topic. Encourage the students to use the space denoted by "Notes:" as a location for personal thoughts about the workspace and how it can be used or improved.]*

In This Course

During the next eight (8) hours we will take you through the new features and functionality of the Tri-Services Workspace. We will start with an overview of the workspace and then take a personal guided tour of the new user interface. At the end of the class, feel free to experiment with other disciplines. We will look at the following items:

- Workspace interface overview

- Layer Box Preferences

- Working with non-compliant drawings

- In-depth look at the Architectural discipline

- In-depth look at the Civil/Site discipline

- In-depth look at the Electrical discipline

- Checker Dialog box

Notes: *[Instructor- Give a quick explanation of the above topics. Try to keep the students from straying away from the three (3) disciplines in the exercises. They are better off learning these three (3) disciplines and applying that knowledge to the others because all of the disciplines work much the same. Time can be set aside at the end of class to experiment with other disciplines.]*

Workspace Interface Overview

In this Chapter

- Using the Workspace
- Working through the interface
- Layerbox Preferences

Using the Workspace

The Tri-Services Workspace is designed to be user friendly. Most operations can be broken down into six (6) or less steps. The following are the six (6) basic steps (Figure 1) needed to use the Tri-Services A/E/C CADD Standards properly:

1. Select the TSWS pull-down menu item for the top of MicroStation's interface.

2. Pick the discipline in which the drawing needs to comply.

3. Select the type of drawing. Each discipline will have several different types of drawings. This will open a toolbox with drawing discipline specific data.

4. Select the appropriate icon.

☞ Most icons can be broken down into two (2) types. The first is "symbology" icons. These icons are designed to set the proper drawing symbology. The second icon type is designed to place standard symbols and patterns.

5. Double click on the type of elements you wish to create.

6. Select the organizational type from the pull-down menu.

☞ All commands will enter the user into an appropriate element placement command, such as "SmartLine" or "Pattern Area".

Notes: [Instructor – Explain to the students that each operation that is done in MicroStation does not require these six (6) steps. In most cases, only step 5 needs to be repeated to select a different symbology type. Using Figure 1 on the next page, explain the six (6) steps to the class.]
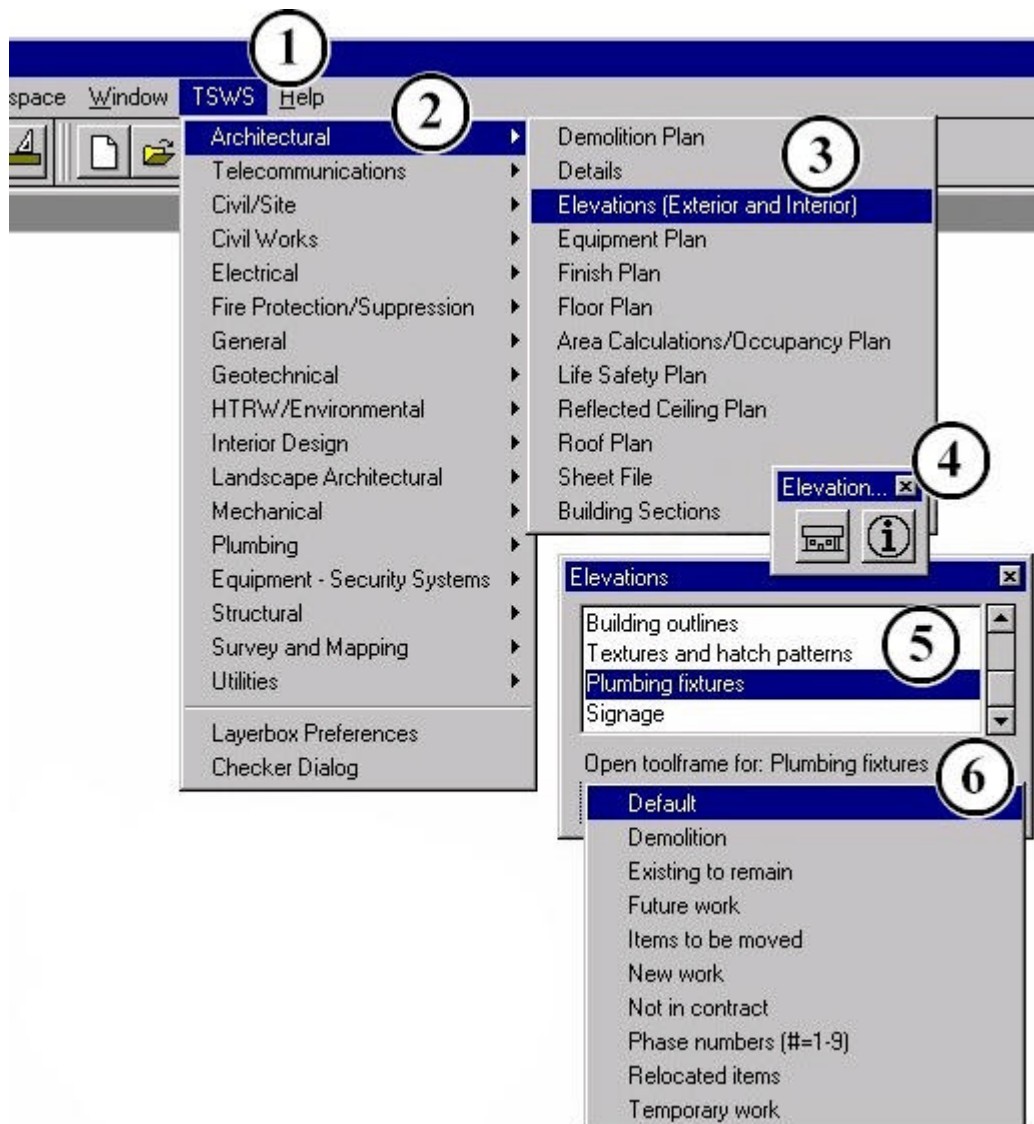
Figure 1 – Six (6) basic steps to the workflow

Exercise 2-1: Starting MicroStation with the Tri-Services Workspace

This exercise will be used as a brief introduction into the Tri-Services Workspace. You will start MicroStation, open an existing design file and change active symbology to match the standards.
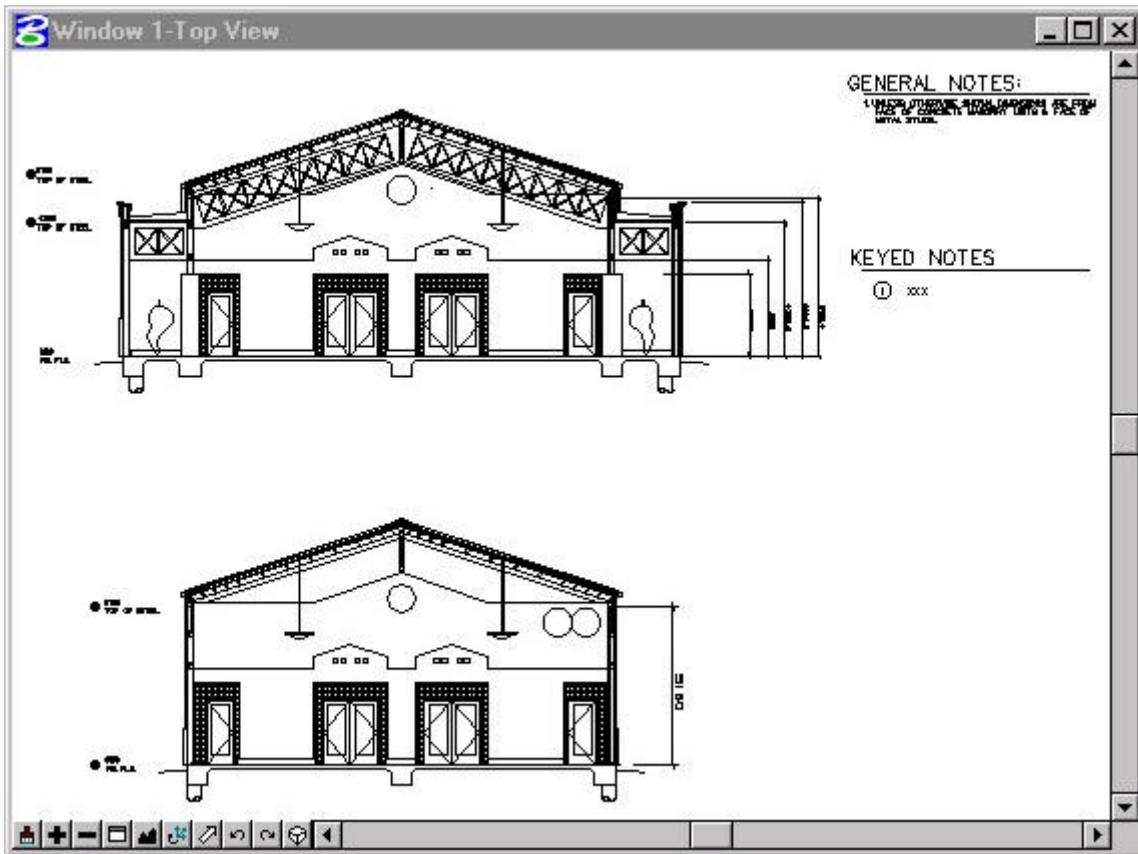
☞ **Start the Workspace**

1. Start MicroStation

2. Open the design file FWAABS*02.DGN*.

This file is in the *class* directory.

This file uses the optional model file naming convention for a building sections model file. It contains two (2) building sections.

3. From the TSWS pull down menu select *Architectural*

4. Select *Building Section* from the Architectural menu.

This will open the Building Sections toolbox.

5. From the Building Sections toolbox, select the building sections icon.

Selecting this icon will open the Layerbox. The **Layerbox** is used for selecting the discipline type of elements. This will be the main utility that the users will use in selecting the attributes that comply with the Tri-Services A/E/C CADD Standards. In this case the Layerbox has element types that are used for Building Sections.
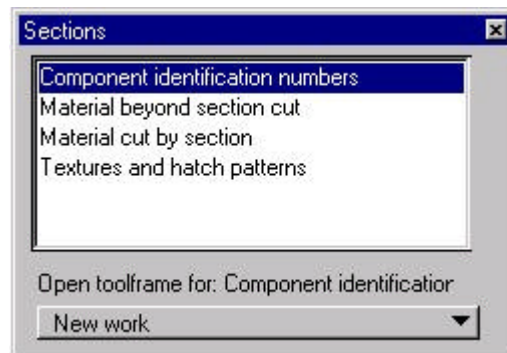
6. From the layerbox list, select *Material cut by section*.

Once a command is selected from the layerbox it will invoke one (1) of the following commands.

*   Symbology Change
*   Text Placement
*   Pattern Placement
*   Dimensions
*   Place Cells

The Material cut by section will change symbology to match the standards as well as starting the default command found in the layerbox preferences. When a symbology changing command is selected it will change the following active settings.

*   Color
*   Level
*   Weight
*   Style

7. Pick *Default* from the organizational options at the bottom of the layerbox.

Selecting the *Drawing Conditions* button at the bottom of the layerbox will affect the active symbology.
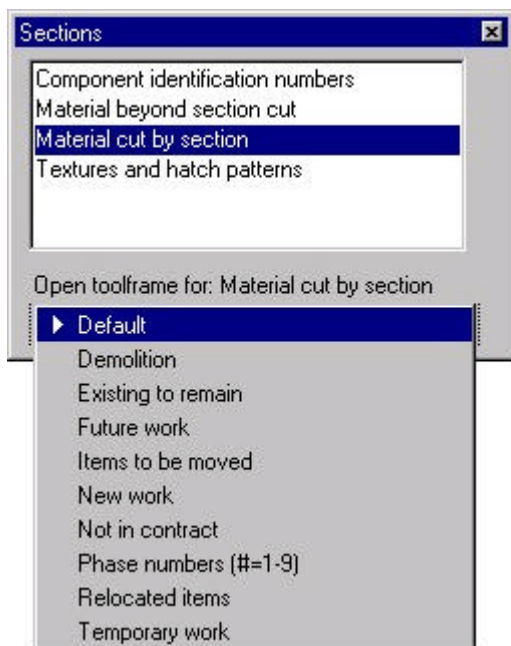
8. Place a standards compliant element into the design file. This can include lines, arcs, circles, curves and other like elements.

Steps 3, 4, 5, 6 and 7 above can more easily be written as (*TSWS>Architectural>Building Sections>Sections>Material cut by section*). This format is used frequently throughout this course.

Layerbox and Layerbox Preferences

The Layerbox in the Tri-Services Workspace is used for selecting the drawing/discipline element types. Layerbox Preferences is the dialog box used for modifying how the Layerbox operates. In addition the "Organizational Options" button at the bottom of the dialog box can be selected to identify the conditions in which the elements will be placed.

Notes: [Instructor – Demonstrate the use of the layerbox and how it will be used in all disciplines. Go through the Layerbox Preferences showing all options. Discuss where you can find out (Users Guide) what the entire string of text is inside of the Layerbox.]

Exercise 2-2: Working with the Layerbox

This exercise will explore the many ways to use the layerbox including modifying the functionality using the Layerbox Preferences.

1. Open design file *e01elp01.dgn*
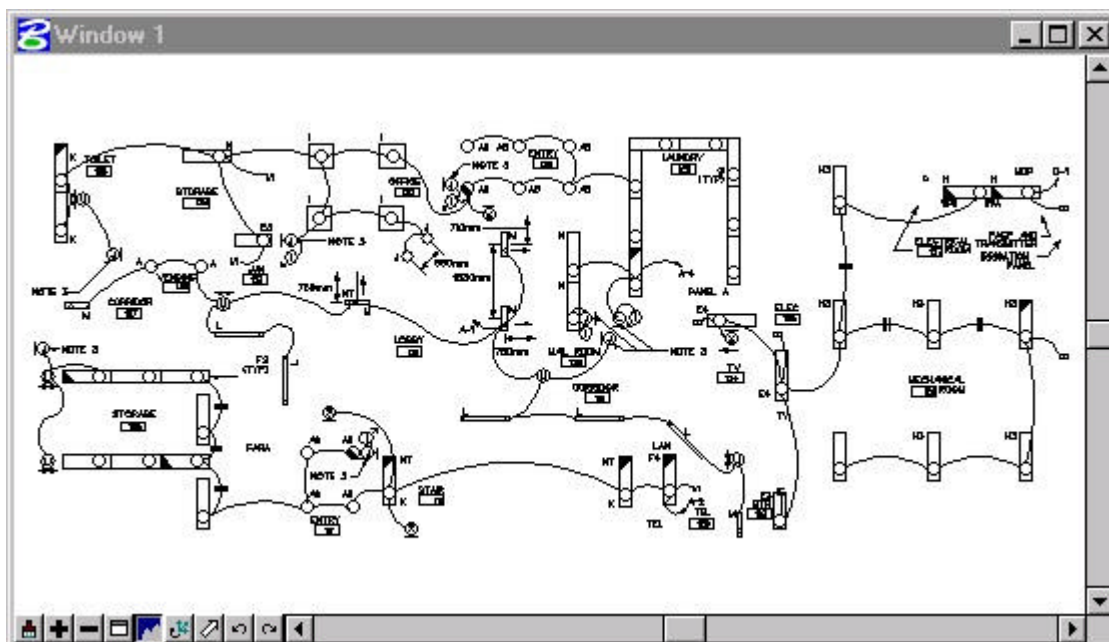
This will open an electrical lighting plan model file. This file uses the Optional Model File naming convention for a file in project E01 in the discipline E (Electrical) with a drawing type of LP (Lighting Plan) and user definable characters of 01.

Opening the Layerbox

1. Open the layerbox for an electrical lighting plan (*TSWS>Electrical>Lighting Plan*).

    This will open the lighting plan's toolbox.

2. Select the Lighting icon from the Lighting Plan toolbox.

    This will open the layerbox with the lighting options listed inside.

Docking Layerbox

1. Hold down the *Data* button and drag the Layerbox by its title bar toward the edge of the MicroStation window to which you want to dock. It will only dock on the top or bottom of MicroStation's interface.

    ☞ As the pointer approaches the edge, the dynamically displayed outline of the toolbox changes to indicate the size of the toolbox if it were to be docked in that location.

2. When the dynamically displayed outline is in the desired docking position, release the *Data* button.
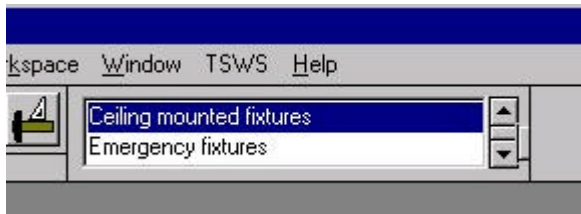
Using the Organizational Options with a Docked Layerbox

1. From the far right side of the docked layerbox select the *organizational options* button. This is a small compact button.
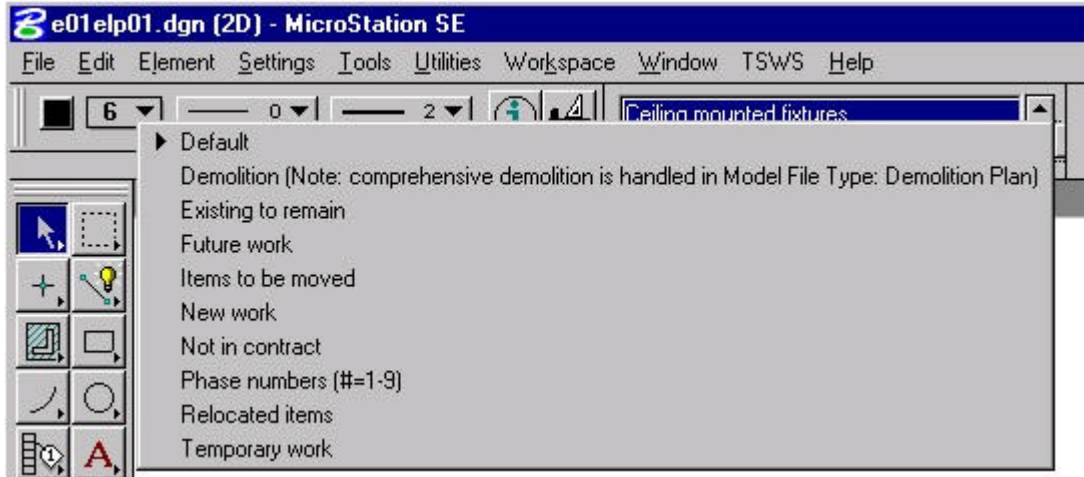
2. From the listing of organizational options select *Existing to remain*. Notice how this changes the active settings in MicroStation.

To Undock a Docked Toolbox

1. Starting with the pointer on the Layerbox's narrow border on a blank area, drag the Layerbox away from the edge of the MicroStation window holding down the *data* button.

2. When the dynamically displayed outline of the Layerbox is in the desired location, release the *Data* button.

☞ A single dragging operation can be used to undock and re-dock a Layerbox. If the Layerbox is docked at the time it is closed, it is automatically docked when it is reopened.

☞ To move the Layerbox or other dockable window to a docking area without docking it, hold down the <Ctrl> key while dragging the title bar.

Opening the Layerbox Preferences

1. Select *Layerbox Preferences* from the TSWS menu listing (*TSWS>Layerbox Preferences*).

This will open the layerbox preference dialog box. These preferences modify how the layerbox interacts with the user.
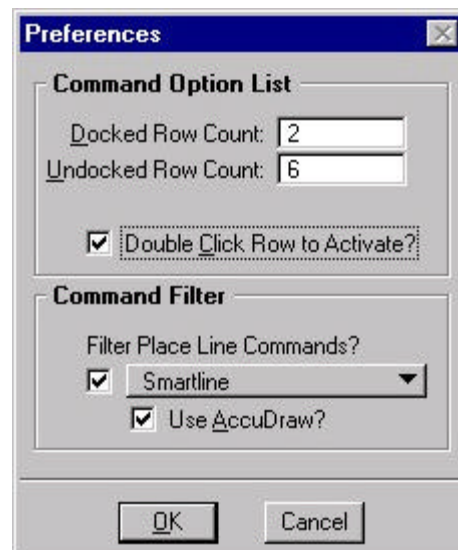
Layerbox Preferences

The Layerbox Preferences have been designed to allow the user to modify the vertical size and functionality of the Layerbox.

The text that is displayed inside of the layerbox is truncated at a set length to optimize screen resolution. A full alphabetical listing of all text can be found in Appendix B of the Users Guide.
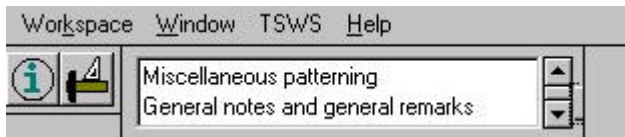
Changing the Docked Row Count

When the Layerbox is docked into MicroStation's interface, this setting will change the height of the dialog box. The default is "2".

1. Dock the layerbox into the top or bottom of MicroStation's interface.

2. Select *Layerbox Preferences* from the TSWS menu listing (*TSWS>Layerbox Preferences*).

3. Change the Docked Row Count to 3.

4. Select *OK* from the bottom of the layerbox preferences to accept the change.
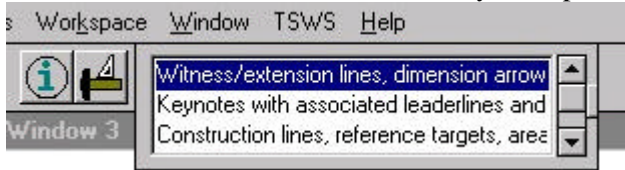
☞ Docked Row Count can be any number between 1 and 5.

Changing the Undocked Row Count

When the Layerbox is undocked into MicroStation's interface, this setting will change the height of the dialog box. The default is 6, but it can be any number between 1 and 20.

1. Undock the layerbox

2. Select *Layerbox Preferences* from the TSWS menu listing (*TSWS>Layerbox Preferences*).

3. Change the Undocked Row Count to 10.

4. Select *OK* from the bottom of the layerbox preferences to accept the change.
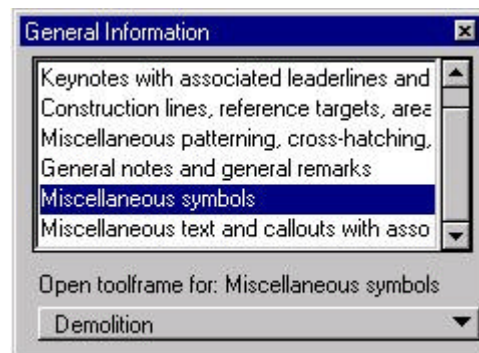
Double Click Row to Activate?

When selecting an element group type in the Layerbox, this option can be used to allow for a single or double click to be used in activating.

1. Select *Layerbox Preferences* from the TSWS menu listing (*TSWS>Layerbox Preferences*).

2. Toggle the *Double Click Row to Activate* setting.

3. Select *OK* from the bottom of the layerbox preferences to accept the change.
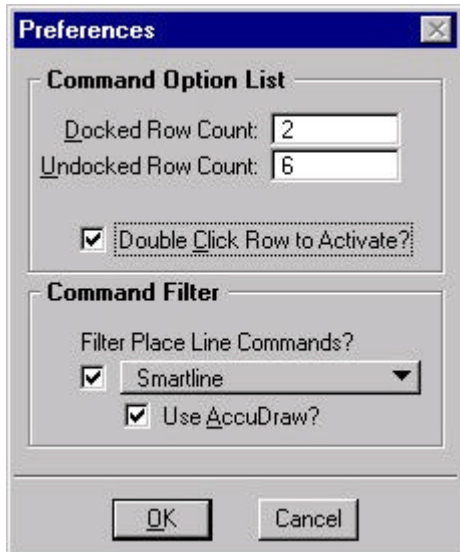
Command Filter

Selecting an option in the Layerbox will sometimes change the active attribute and also enter the user into an element placement command. This option allows for Smartline, line or linestring to be selected and will be used as the default element type for the workspace. In addition, below this setting in the check box allows the user to automatically start AccuDraw each time the default element type is used.

Architectural Discipline

In this chapter we will explore the interface, compliant element placement and the many drawing types of the Architectural Discipline. We will also create model and sheet files. The Architectural Discipline is divided into 12 drawing types listed below:

- Demolition Plan
- Details
- Elevations (Exterior and Interior)
- Equipment Plan
- Finish Plan
- Floor Plan
- Area Calculations/Occupancy Plan
- Life Safety Plan
- Reflected Ceiling Plan
- Roof Plan
- Sheet File
- Building Sections

Each of these drawing types has the necessary symbology and standard symbols for creating standards compliant drawings.

Exercise 3-1: Naming Architectural Files

Using the Quick Name Guide in the back of this manual, generate a compliant name for the following drawings. Write the name in the blank provided. The instructor will display or check your answers when the class has completed this section.

- Use **ABC** as a project name if needed.
- Use **1** for all sheet sequence numbers if needed. This could be displayed as **1** or **01**.
- Use **X** for all user definable characters if needed. This may be 1 to 4 characters in some cases and can be displayed as **X**, **XX**, **XXX** or **XXXX**.
- Use **4** for all sheet type codes/designators if needed.

Drawing Type	File Name
Demolition Plan	ABCADPXX.DGN
Details	ABCADTXX.DGN
Elevations	ABCAELXX.DGN
Equipment Plan	ABCAQPXX.DGN
Finish Plan	ABCANPXX.DGN
Floor Plan	ABCAFPXX.DGN
Area Calculations/ Occupancy Plan	ABCAACXX.DGN
Life Safety Plan	ABCALSXX.DGN
Reflective Ceiling Plan	ABCACPXX.DGN
Roof Plan	ABCARPXX.DGN
Sheet Files	ABCA401X.DGN
Building Sections	ABCABSXX.DGN

Notes: [Instructor – Use this time to cover how to use the Quick Naming Guide and where it can be found. Talk about the flexibility of the sheet sequence and user definable characters.]

Exercise 3-2: Creating a Model File

Creation of model files is often the first step in the process of developing engineering documents. In this exercise we will create a model file using a standard compliant name and proceed to place elements that are compliant with the A/E/C CADD Standards.

Creating a Model File

The first step is the physical creation of the file. In the next section we will create a model file to be used as a floor plan. It is very important that the proper seed file is used so that working units and other settings are accurate. Just as important is the name of the file. The checker uses the name when verifying compliance.

1. Start MicroStation.

    We need to be at the MicroStation Manager dialog box.

2. Open the *create design file* menu. (*File>New*)

3. From the bottom of the MicroStation Manager dialog box in the Seed File section, pick *Select*.

    This will open the *Select Seed File* dialog box.

4. From the TSWS/seed directory select I_AEC_3D.DGN seed file.

    This file uses the Imperial units and has working units set to feet and inches with units of 12 and 8000.

5. Select *OK*.
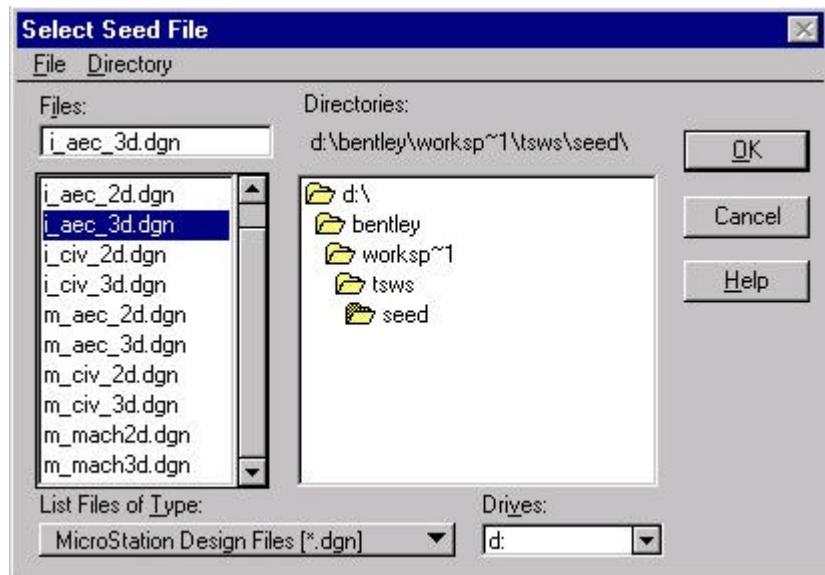
6. Keyin a file name of B2CAFP01.DGN as the new file to create.

    The file B2CAFP01.DGN uses the optional model file naming. This file would be in a project called *B2C* in the architectural discipline with a drawing type of *FP* for floor plan and user definable characters of *01*.

7. Select *OK* to create the file.

8. Select *OK* to open the file.

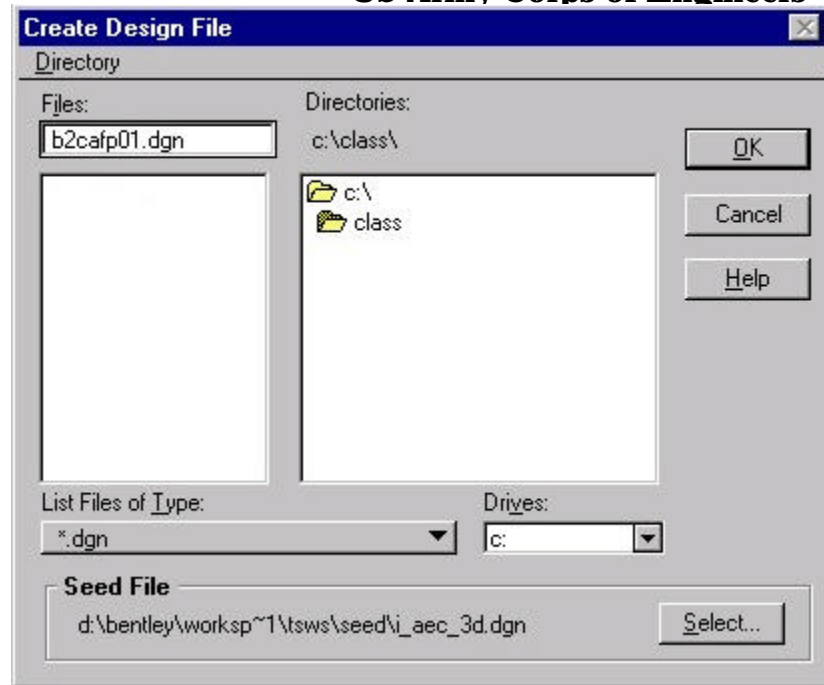Create Design File dialog box. Directory menu. Files: b2cafp01.dgn. Directories: c:\class\ showing c:\ and class folders. Buttons: OK, Cancel, Help. List Files of Type: *.dgn. Drives: c:. Seed File: d:\bentley\worksp~1\tsws\seed\i_aec_3d.dgn. Select... button.

Create a Small Floor Plan

In this section we will create a small 20' x 30' floor plan with a 3' door.

1. Select *Floor Plan* from the architectural discipline under the TSWS pull down menu (*TSWS>Architectural>Floor Plan*).

    Once the drawing scale has been selected, the Architectural Floor Plan toolbox will display.

Floor Plan toolbox with icons.

2. From the Select Scale dialog box, select the *¼"=1'* scale.

3. Select *OK*.

    Setting the scale will automatically adjust the placement size of certain elements (text, cells and patterns).

Select Scale dialog box with options: 1"=500', 1"=1000', 1"=2000', 1/4"=1' (highlighted), 1/8"=1', 1/16"=1', 1/2"=1', 3/4"=1'. OK and Cancel buttons.
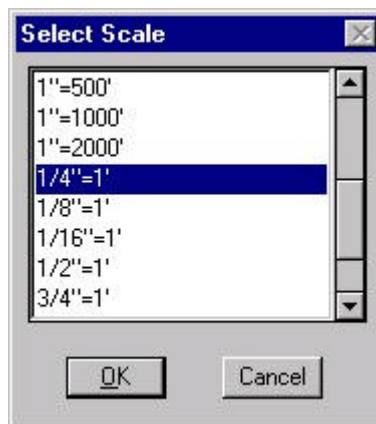
4. From the Floor Plan menu select the *Walls* icon.

5. Inside of the Layerbox select *Exterior full height walls*.

    This will change the active settings inside of MicroStation to the compliant symbology for walls.

6. Create a 20' x 30' building outline shape using the *SmartLine* or *place block* in the top view (Window 1).

7. Using the *copy parallel*, create a 1' thickness to the walls.
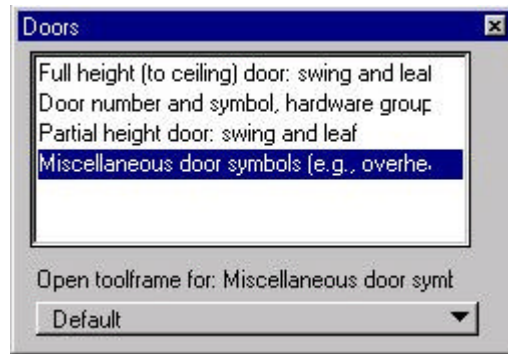
8. From the Floor Plan menu select the *Doors* icon.

    This will open the Layerbox with the door options listed.

9. Select the *Miscellaneous door symbols (e.g., overhead, bifold, pocket, etc.)* from the layerbox.

    This will open the *Object for Miscellaneous door symbols* toolbox with the options for door type.

10. From the *Object for Miscellaneous door symbols* toolbox, select the *Left Double Door* option.

    This will open the cellbox with the options for door size.

11. From the Cellbox select the *6'-0" Left Double Door*.

    At this point MicroStation will activate the place cell command with the proper cell name and scale in place.
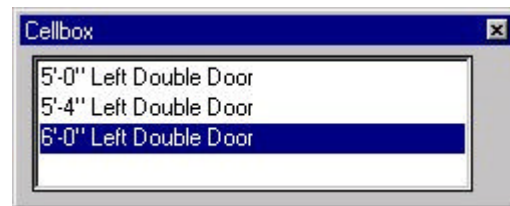
12. Place the door at the bottom center of the floor plan.

13. It will be necessary to clean up the existing wall with the partial delete command, trim off any access lines and place the door header lines.

*Notes: [Instructor – **When the slowest student reaches this point you should move the class to exercise 3-3]***

Your design should look like the following.
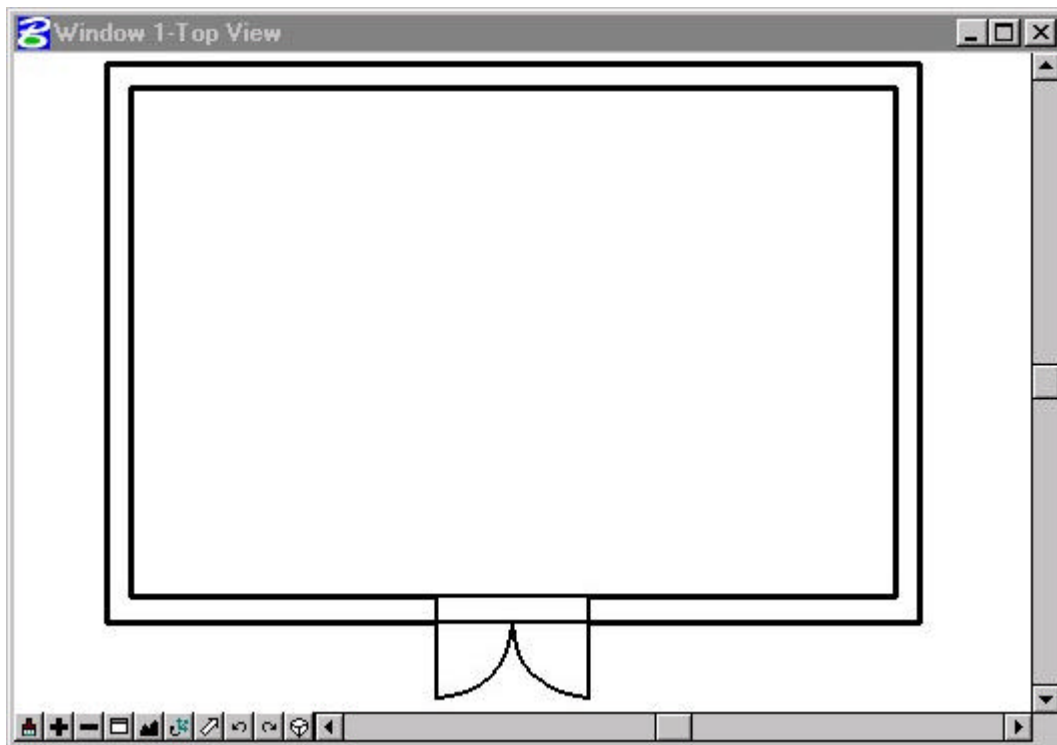
Notes: *[Instructor - The intent is not to have a perfect architectural drawing, but to practice placement of standards compliant elements. Encourage the faster students or the architectural students to also work on the Optional Design. Use this time to catch the slower students up with the rest of the class.]*

Optional Design – Creating a Model File

If time permits, this optional design can be done to the floor plan created in exercise 3-2. All interior walls are to be 6".
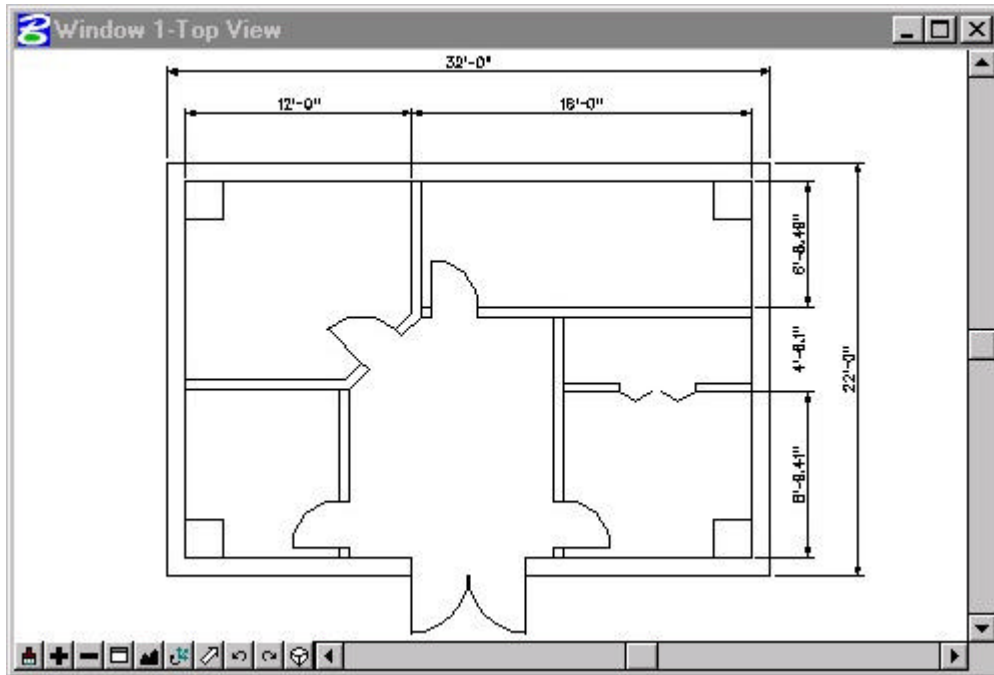
Exercise 3-3: Creating a Sheet File

Creation of the sheet file is the collection of model files referenced into a single file to be plotted. This often requires editing the reference file attachments with clipping, scaling and layer display functions. In this exercise we will be creating a sheet file and reference a border file and three (3) other model files to complete our sheet file.

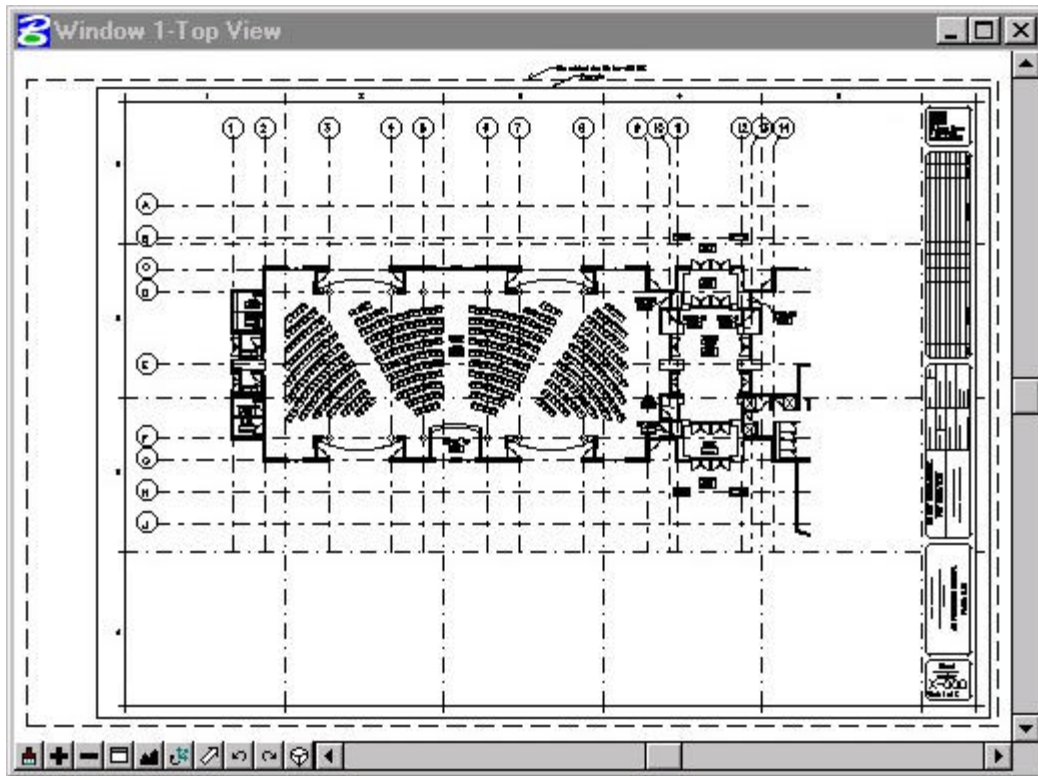### Create a New Sheet File

In this next section we will create a sheet file. For this sheet file we will be using a metric seed file to match the model file working units. The creation of the sheet file will have less detail than the previous exercise. If help is needed, refer to the instructor or the previous exercise.

1. Start MicroStation

   We need to be at the MicroStation Manager dialog box.

2. Open the create design file menu. (*File>New*).

3. From the bottom of the MicroStation Manager dialog box in the Seed File section, pick *Select*.

   This will open the Select Seed File dialog box.

4. From the TSWS/seed directory select M_AEC_3D.DGN seed file.

   This file uses the Metric units and has working units set to mm with 1 and 10 for the resolution.

5. Select *OK*.

6. Keyin a file name of FWAA101A.DGN.dgn as the new file to create.

   The file FWAA101A.DGN uses the optional sheet file naming. This file would be in a project called *FWA* in the architectural discipline (A) with a drawing type of Plans (1) and a sheet sequence of *01* with a user definable character of *A*.

7. Select *OK* to create the file.

8. Select *OK* to open the file.

Attaching the Floor Plan Model File
[Instructor – As a short cut the user can modify all of the reference file attachment in one step.]
Once we have the sheet file created we need to attach all four (4) of the model files used in this sheet file.

1. Open the *Reference File* menu (*File>Reference*) or (TSWS>Architectural>Sheet File)

2. Open the *attach reference file* dialog menu (*Tools>Attach*).

3. Navigate to the class directory and select the floor plan FWAAFP01.DGN.

4. Select *OK*.

5. Keyin a logical name of *AFP* in the *Attach Reference File* dialog box.

6. Keyin a description of *FLOOR PLAN* in the *Attach Reference File* dialog box.

7. Verify that the Nest Depth is set to 0.

   A nest depth of greater than 0 will result in any reference file that is attached to the file will also be attached as a separate reference file attachment. This is usually not the desired result.

8. Select *OK*.

9. Use the *Fit* command to view the reference file.

10. Place a fence around the area on the far-left side of the floor plan to be used.

11. From the Reference Files dialog box select the *Clip Boundary* command (*Tools>Clip Boundary*).

Your drawing should look like the following:
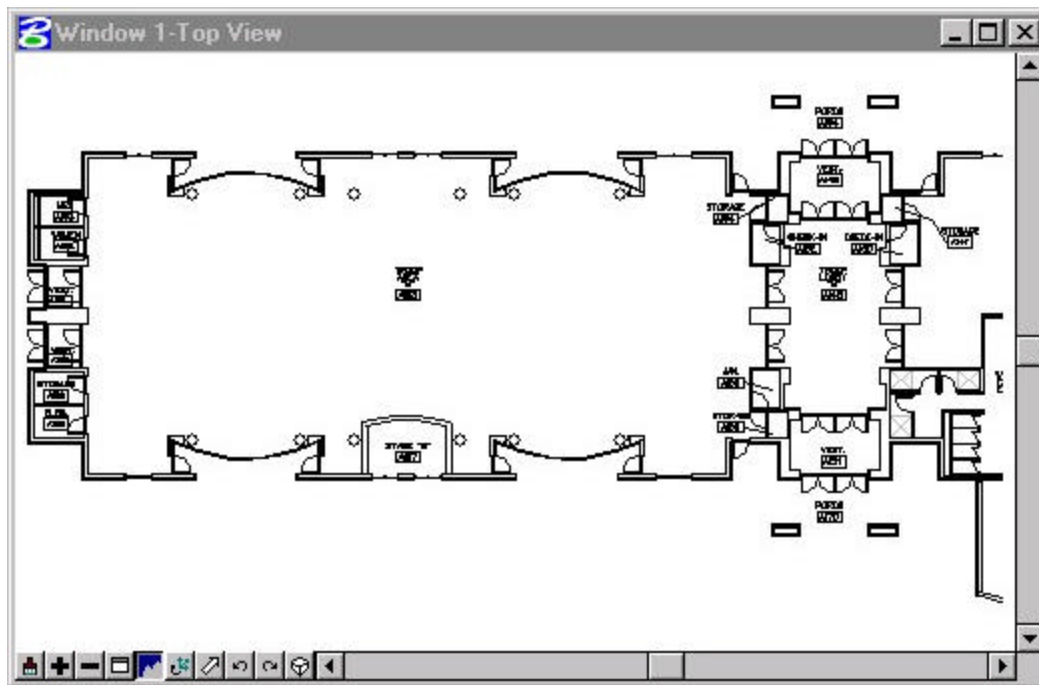
Attach the Furniture Plan

1. Open the *Reference File* menu (*File>Reference*).

2. Open the *attach reference file* dialog menu (*Tools>Attach*).

3. Navigate to the class directory and select the floor plan FWAIRP01.DGN.

4. Select *OK*.

5. Keyin a logical name of IRP in the *Attach Reference File* dialog box.

6. Keyin a description of *FURNITURE PLAN* in the *Attach Reference File* dialog box.

7. Verify that the Nest Depth is set to 0.

8. Select *OK*.

9. Place a fence around the area of the floor plan to be used.

10. From the Reference Files dialog box select the *Clip Boundary* command (*Tools>Clip Boundary*)
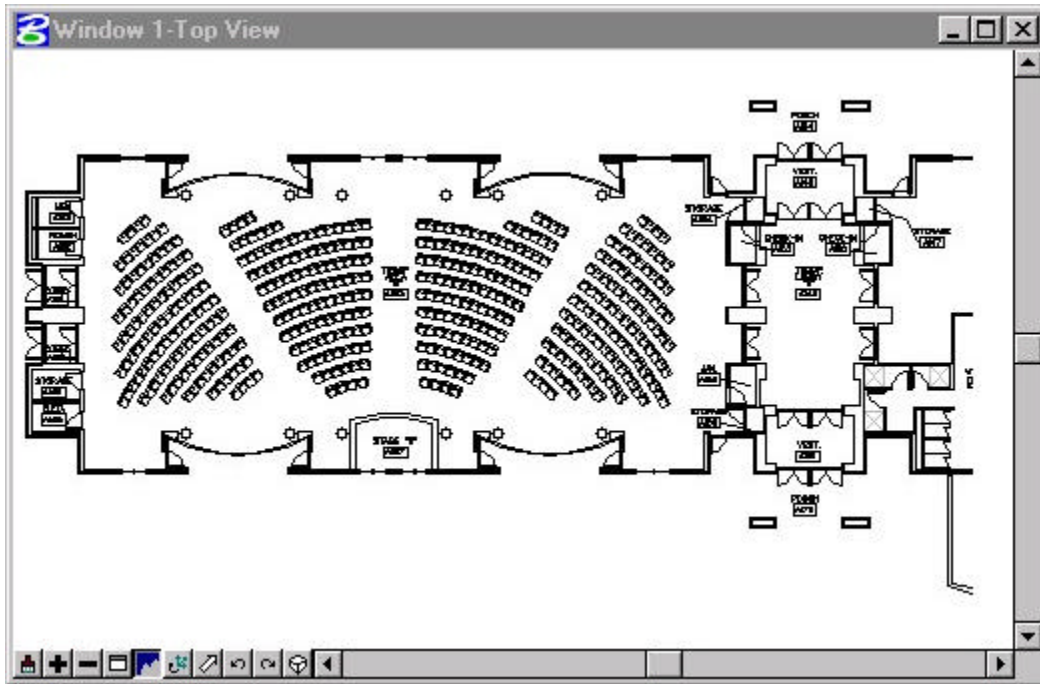
Your drawing should look like the following:

Attach the Column Plan

1. Open the *Reference File* menu (*File>Reference*).

2. Open the *attach reference file* dialog menu (*Tools>Attach*).

3. Navigate to the class directory and select the floor plan FWASCP01.DGN.

4. Select *OK*.

5. Keyin a logical name of *SCP* in the *Attach Reference File* dialog box.

6. Keyin a description of *COLUMN PLAN* in the *Attach Reference File* dialog box.

7. Verify that the Nest Depth is set to 0.

8. Select *OK*.

9. Place a fence around the area of the floor plan to be used.

10. From the Reference Files dialog box select the *Clip Boundary* command (*Tools>Clip Boundary*)
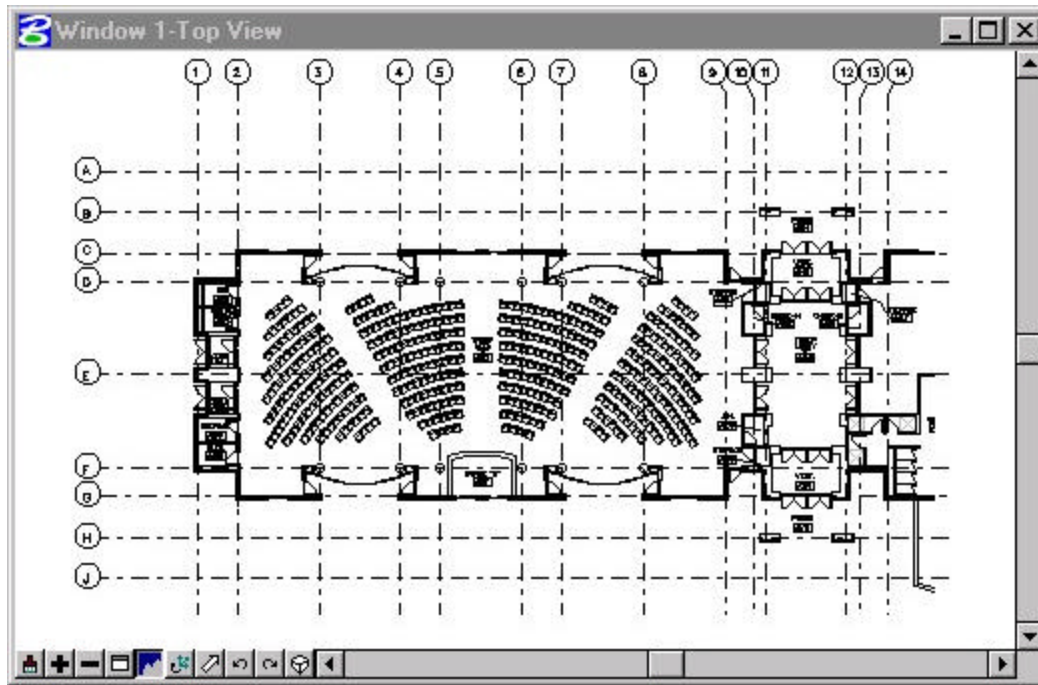
Your drawing should look like the following:

**Attach the Border File**

1. Open the *Reference File* menu (*File>Reference*).

2. Open the *attach reference file* dialog menu (*Tools>Attach*).

3. Navigate to the class directory and select the floor plan FWAGBS00.DGN.

4. Select *OK*.

5. Keyin a logical name of GBS in the *Attach Reference File* dialog box.

6. Keyin a description of BORDER FILE in the *Attach Reference File* dialog box.

7. Verify that the Nest Depth is set to 0.

8. Select *OK*.

9. Scale the reference file up to fit around the floor plan. Select the *Scale Reference File* command from the *reference* dialog box (*Tools>Scale*).

10. Enter in a scale of 100 to 1.
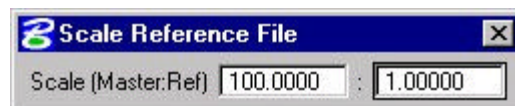
11. Identify a point to scale the reference file about with a data point inside of the view.

12. Move the *border reference* file to the proper location using the *reference move* command (*Tools>Move*).

Your drawing should look like the following:
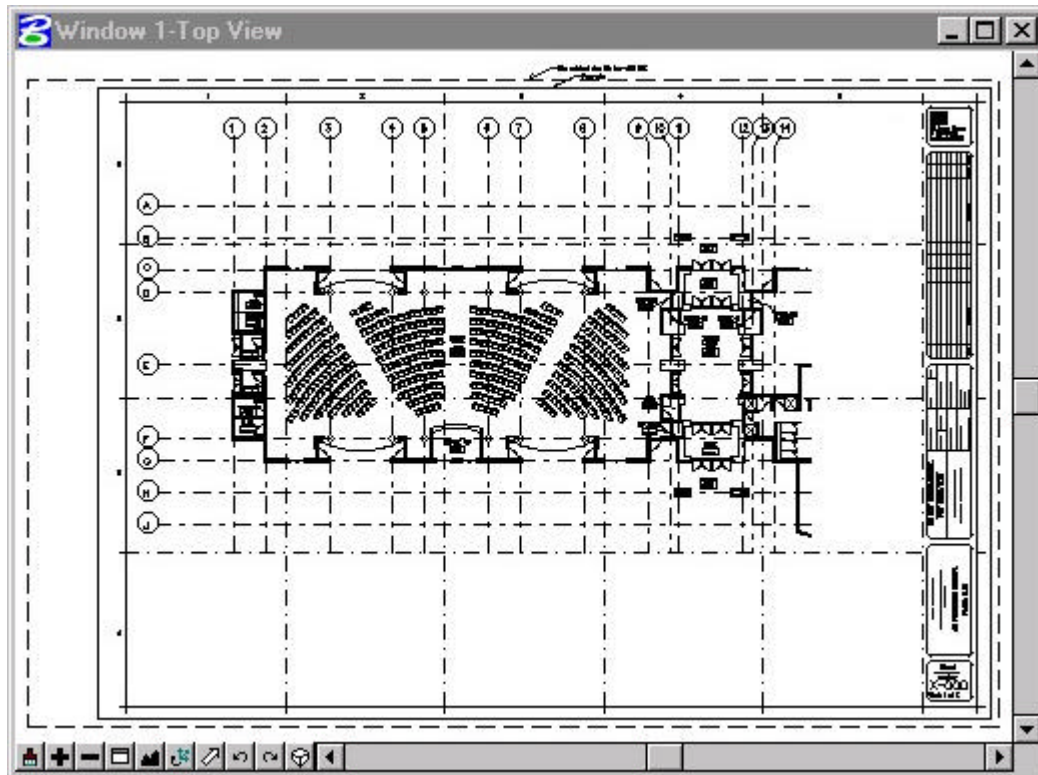
Turn off the Border File Section Lines

If desired, the border file section lines can be turned off. These lines reside on level 3 of the border file. Using the reference dialog box we can turn off and on levels in a reference file without affecting the active file's elements.

1. Open the *Reference File* menu (File>Reference).
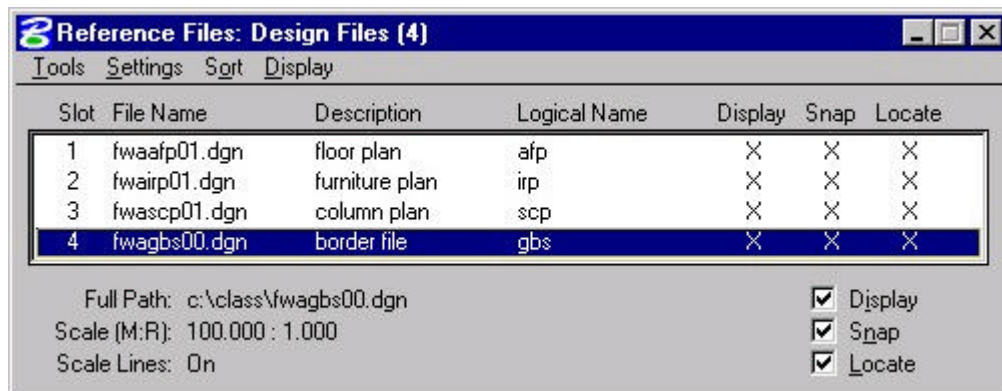
2. Select the border file reference attachment.

3. Open the *reference level* dialog menu
    (*Settings>Levels*).

4. Toggle level 3 off.

5. Select *All*.

    Selecting *All* will make the change effective on
    all windows (1 through 8) of the active design
    file. Selecting the *Apply* button will only affect
    the view that is selected at the top of the dialog
    box.

6. Dismiss the dialog box by selecting the *X* at the
    top right side of the reference dialog box.

    This method of turning off and on levels of a
    reference file menu can be used independently with multiple reference files and has no effect
    on the elements in the active file.
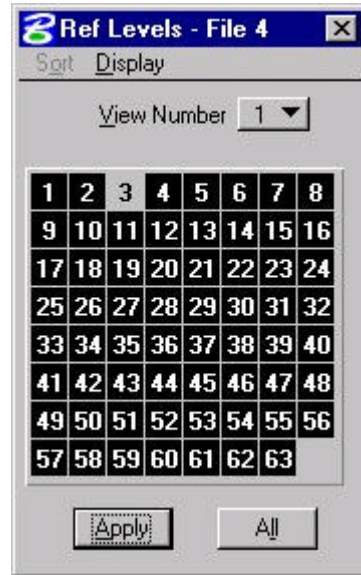
Adding the Title Block Text

Inside of the title block we need to add a few lines of text. The first is a drawing description of
FLOOR PLAN and then a sheet number. For additional practice, place text in the design file
information area, such as name, date, file name, etc.

1. Open the *Floor Plan* toolbox (*TSWS>Architectural>Floor Plan*).

2. Select the 1mm = 100mm scale from the
    Select Scale dialog box.

    This is the printable scale of the sheet file. It
    also corresponds to the scale of the border
    file used. This will change the size of the
    text to be correct upon placement.
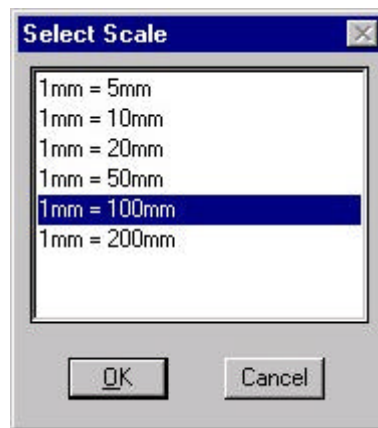
3. Select the *General Information* icon from the Floor Plan toolbox.

4. From the layerbox select the *Miscellaneous text and callouts…*

5. Select the *place text* command.

6. Keyin *FLOOR PLAN* in the text editor.

7. Set the active angle to 90°.

8. Place the text below the line that has AIR PASSENGER TERMINAL.

9. Repeat the place text command for placing other text in the title block.

Notes: [Instructor – Avoid too many questions from the architectural students. Some pessimistic students can very easily stick you in the architectural chapter for a very long time. Inform them that at the end of the class, if time permits, that there will be a question and answer session that all disciplines can be questioned]

Electrical Discipline

In this chapter we will explore the Electrical discipline of the Tri-Services Workspace. This chapter will contain less detail on many of the commands covered in the previous chapter. The Electrical discipline is divided into nine (9) drawing types including the following:

- Demolition Plan
- Details
- Grounding System
- Auxiliary Power Plan
- Lighting Plan
- One-Line Diagrams
- Power Plan
- Riser Diagrams
- Sheet Files

Each of these drawing types has the necessary symbology and some standard symbols for creating standards compliant drawings.

We will first take a look at the model file names and then placing compliant elements to finish an existing model file. Then we will create a new sheet file, attach the necessary model files including a border file and complete the sheet file with notes and annotation.

Exercise 4-1: Naming Electrical Files

Using the Quick Name Guide in the back of this manual, generate a compliant name for the following drawings. Write the name in the blank provided. The instructor will display or check your answers when the class has completed this section.

- Use **ABC** as a project name if needed.
- Use **1** for all sheet sequence numbers if needed. This could be displayed as **1** or **01**.
- Use **X** for all user definable characters if needed. This may be 1 to 4 characters in some cases and can be displayed as **X**, **XX**, **XXX** or **XXXX**.
- Use **5** for all sheet type codes/designators if needed.

Drawing Type	File Name
Demolition Plan	ABCEDPXX.DGN
Details	ABCEDTXX.DGN
Grounding System	ABCEGPXX.DGN
Auxiliary Power Plan	ABCEAPXX.DGN
Lighting Plan	ABCELPXX.DGN
One-Line Diagrams	ABCEDGXX.DGN
Power Plan	ABCEPPXX.DGN
Power Riser Diagrams	ABCEPRXX.DGN
Sheet Files	ABCE501X.DGN

Notes: [Instructor – Use this time to review how to use the Quick Naming Guide.]

Exercise 4-2: Working with Model Files

Working with model files is the majority of the Tri-Services Workspace and also the majority of design time. In this exercise we will open an existing model file and complete the design using compliant elements selected with the workspace.

Opening the model File and Electrical Related Menus

We need to first open the model file and select the proper drawing type.

1. Start MicroStation

    We need to be at the MicroStation Manager dialog box.

2. Select file E01ELP01.DGN from the class directory.

3. Select *OK*.

4. Based on the file name E01ELP01.DGN select the proper drawing type from the TSWS pull-down menu.   *[Instructor – This will be TSWS>Electrical>Lighting Plan]*

    This will open the toolbox for this drawing type.

5. Turn the display on for the floor plan reference file E01AFP01.DGN

    This will display the floor plan. Usually this reference file will also be referenced by the sheet file for the lighting plan.

Adding Lighting Circuits

In this section you will add the lighting circuits that are missing.

1. Zoom into the bottom right side of the floor plan (Mechanical Room).

2. Select the *Circuit Lines* icon from the lighting toolbox.

3. From the layerbox, select *Lighting Circuits.*

4. Create the missing lighting circuits.

Your completed circuits should look like the following:
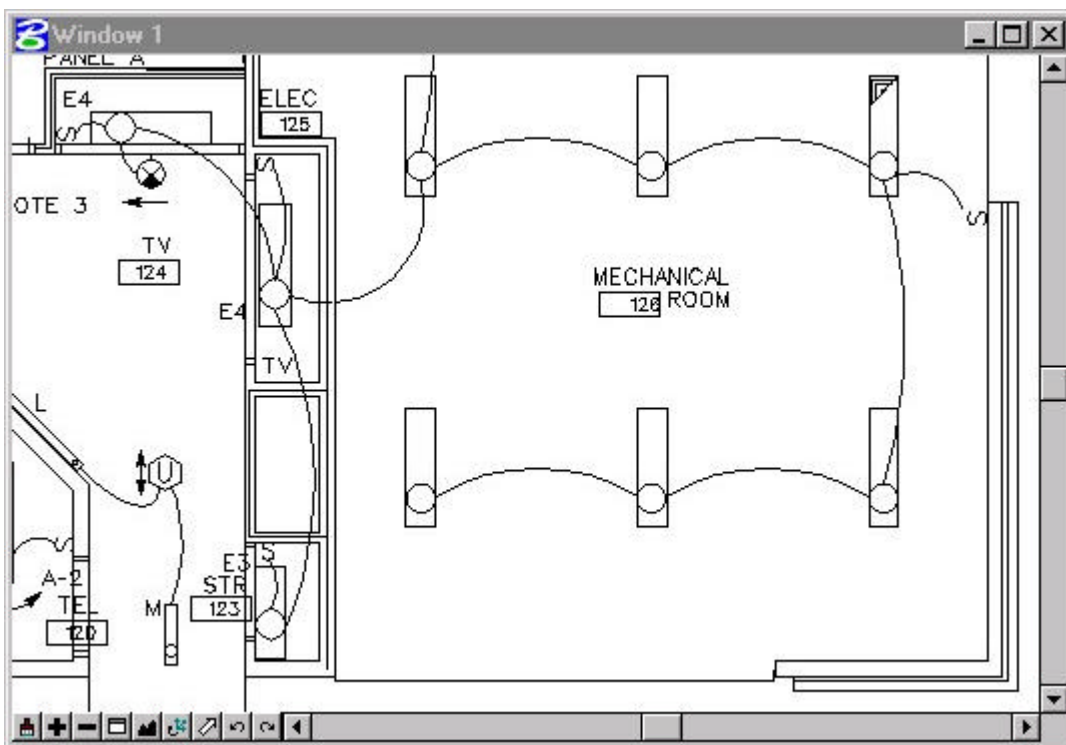
Adding the Light Fixtures and Circuits

1. Zoom into the office in the top left side of the building.

2. From the lighting plan toolbox select the *lighting* icon.

3. Select *Ceiling Mounted Fixtures* from the *layerbox.*

    This will adjust the active settings inside of MicroStation to the standards for creating the graphics for the lighting fixture mounted on the ceiling.

4. Create the graphics for the missing 2' x 2' light fixtures.

    Since this is a metric file use 610mm x 610mm for the actual size of the light fixtures. After completing one, copy it to the remaining locations.

Add lighting Circuits for the Light Fixtures

1. Select the *Circuit Lines* icon from the lighting toolbox.

2. From the layerbox, select *Lighting Circuits.*

3. Create the missing lighting circuits.

Place Light Fixture Identification Tags

In this section we will place light fixture identification tags to correspond with the lighting schedule.

1. From the lighting plan toolbox select the *lighting* icon.

2. Select *Lighting Fixture Identification Tags* from the layerbox.

3. Place the letter "P" next to each of the newly placed light fixtures.

Your completed lights and circuits should look like the following:
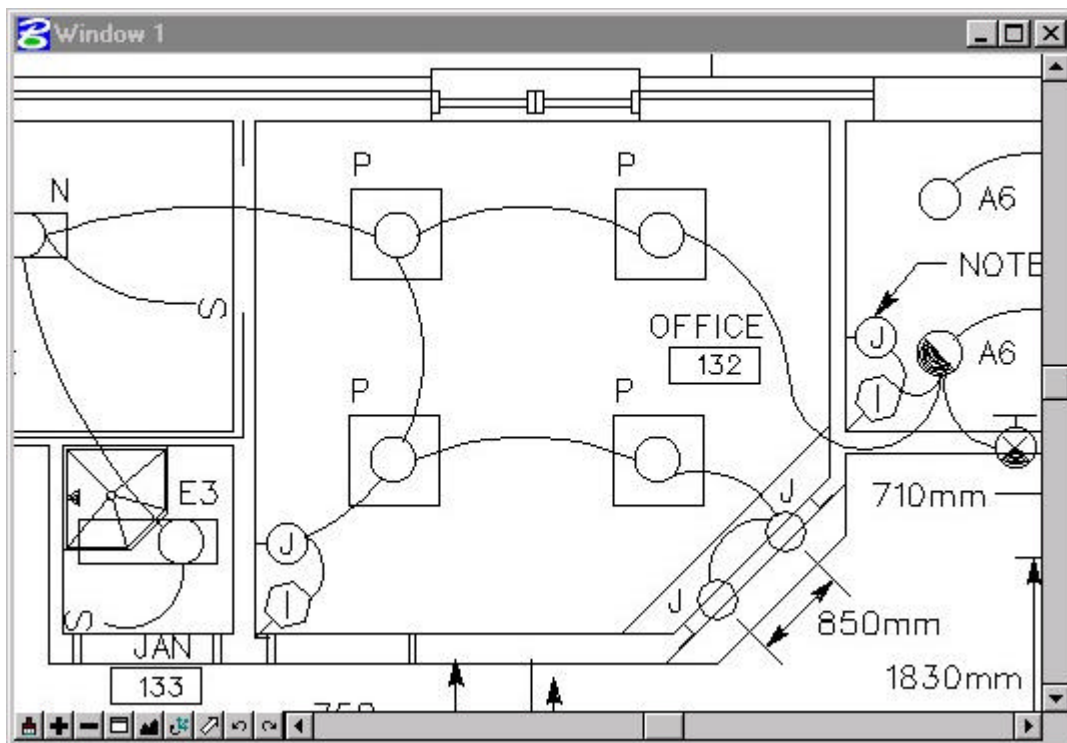
Exercise 4-3: Creating Electrical Sheet Files

In this exercise we will create a new sheet file, then reference all the necessary model files. This will involve referencing model files from other disciplines and also different working units. The completed sheet file should look like the following:
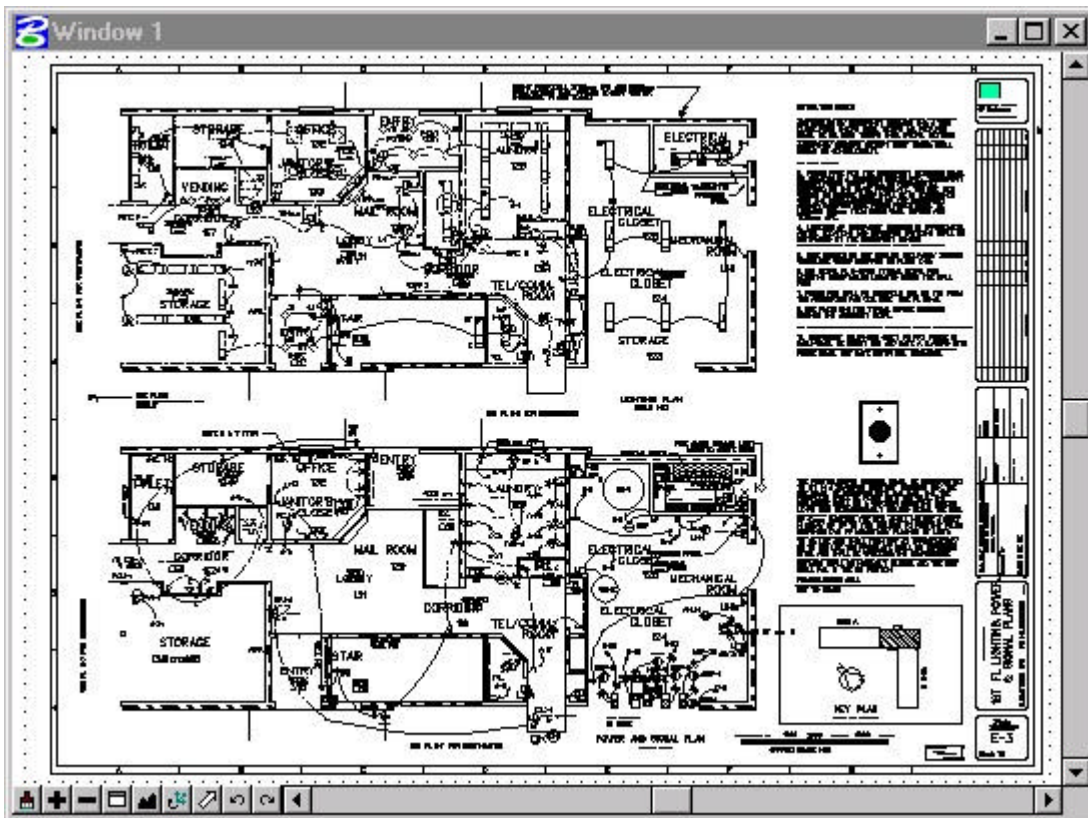
Create a New Sheet File

In this next section we will create a sheet file. For this sheet file we will be using a metric seed to match the model file working units.

1. Start MicroStation

2. Open the *create design file* menu (*File>New*).

3. From the bottom of the dialog box in the *Seed File* section, pick *Select*.

    This will open the *Select Seed File* dialog box.

4. From the TSWS/seed directory select the file M_AEC_2D.DGN from the list.

    This will use the Metric units of mm and resolution set to 1 and 10.

5. Select *OK*.

6. Keyin a file name of E01E401A.DGN as the new file to create

   The file E01E401A.DGN uses the optional sheet file naming. This file would be in a project called E01 in the electrical discipline (E) with a drawing type of 4 (Large scale plans, elevations, or sections that are not details) and sheet sequence of 01 with a user definable character of a.

7. Select *OK* to create the file

8. Select *OK* to open the file

Attaching the Model Files

Once we have the sheet file created we need to attach all of the model files used for this sheet file. The model files used for this sheet file include:

- E01AFP01.DGN (Two times)
- E01ELP01.DGN
- E01EPP01.DGN
- E01GBS01.DGN
- E01EDT01.DGN

1. Open the *Reference File* menu (*File>Reference*)

2. Open the *attach reference file* dialog menu (*Tools>Attach*)

3. Navigate to the class directory and select the floor plan E01AFP01.DGN

4. Select *OK*

5. Keyin a logical name of AFP1 in the Attach Reference File dialog box

6. Keyin a description of TOP FLOOR PLAN in the Attach Reference File dialog box

7. Verify that the Nest Depth is set to 0

   A nest depth of greater that 0 will result in any reference file that is attached to the file will also be attached as a separate reference file attachment. This is not usually the desired result.

8. Select *OK*

9. Use the *Fit* command to view the reference file

10. Place a fence around the floor plan to be used

11. From the Reference Files dialog box select the *Clip Boundary* command (*Tools>Clip Boundary*)

    Repeat these steps to attach all of the model files listed above.

Move and Scale Model Files

1. Scale the border file to 50:1

2. Move reference files to the proper locations

3. Create clip boundaries where needed

4. Adjust reference file levels where needed

Civil/Site Discipline

In this chapter we will explore the Civil/Site discipline of the Tri-Services Workspace. Starting out, we will cover the naming conventions for civil/site sheet and model files. Then we will work with model files. We will also use non-compliant model files with a new, compliant sheet file. The Civil/Site discipline is divided into 10 drawing types including the following:

- Airfield Pavement Plan
- Demolition Plan
- Details
- Airfield Plan
- Grading Plan
- Sections/Elevations
- Site Plan
- Transportation Pavement Plan
- Transportation Site Plan
- Channel Plan

Each of these drawing types contains the necessary element types, symbols and symbology to create standards compliant drawings.

Exercise 5-1: Naming Civil/Site Files

Using the Quick Name Guide in the back of this manual, generate a compliant name for the following drawings. Write the name in the blank provided. The instructor will display or check your answers when the class has completed this section.

- Use **ABC** as a project name if needed.
- Use **1** for all sheet sequence numbers if needed. This could be displayed as **1** or **01**.
- Use **X** for all user definable characters if needed. This may be 1 to 4 characters in some cases and can be displayed as **X**, **XX**, **XXX** or **XXXX**.
- Use **5** for all sheet type codes/designators if needed.

Drawing Type	**Optional Name**
Airfield Pavement Plan	ABCCAIXX.DGN
Demolition Plan	ABCCDPXX.DGN
Border Model File	ABCGBSXX.DGN
Details	ABCCDTXX.DGN
Airfield Plan	ABCCAFXX.DGN
Grading Plan	ABCCGPXX.DGN
Sections	ABCCSCXX.DGN
Site Plan	ABCCSPXX.DGN
Transportation Pavement Plan	ABCCPVXX.DGN
Transportation Site Plan	ABCCTSXX.DGN
Sheet File	ABCC501X.DGN
Channel Plan	ABCCCPXX.DGN

Notes: *[Instructor – Use this time to review how to use the Quick Name Guide.]*

Exercise 5-2: Editing Existing Model Files

In this exercise we will use a pre-existing civil/site model file to demonstrate working with existing data.

Opening the Civil/Site Model File

1. Start MicroStation

2. Open file B6ACDT01.DGN from the class directory

You should see the following drawing:
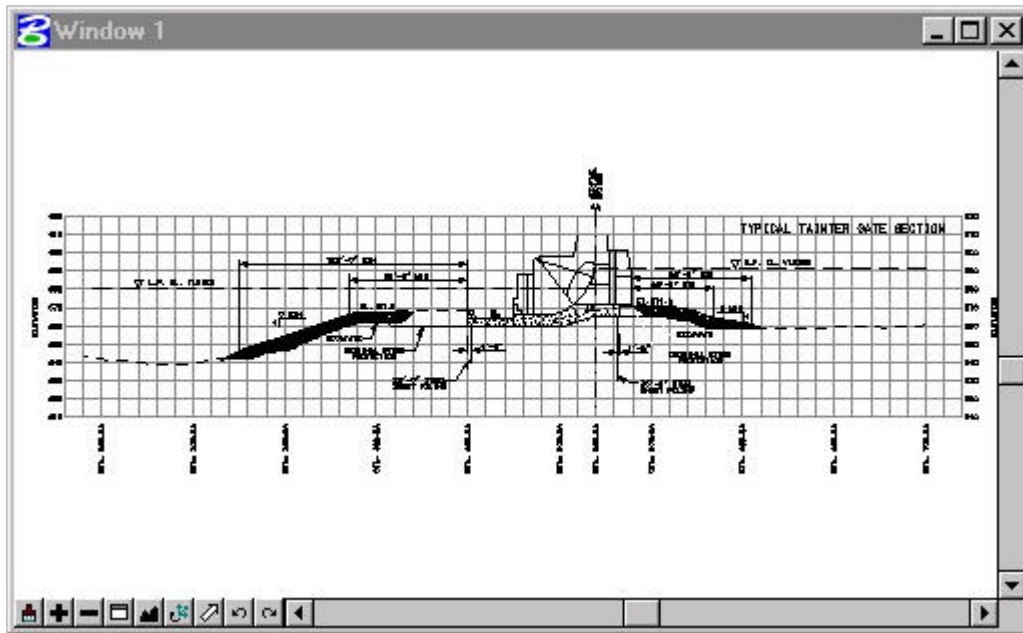
This non-compliant model file is a good example of working with pre-existing data. In some cases when modifying existing files it is not always possible to create new compliant elements. In this next section we will use the workspace to select the proper element discipline types from the workspace in an attempt to create compliant elements, however, it may be necessary to place matching non-compliant elements for presentation purposes.

Adding Elements into the Model File

1. Zoom into the right side of the drawing just above the patterning.

2. Turn level 60 off

    This will turn the grid lines off that are on level 60. This is done to allow greater visibility.

3. Open the *Civil/Site Details* toolbox (*TSWS>Civil/Site>Details*)

The following message should appear:

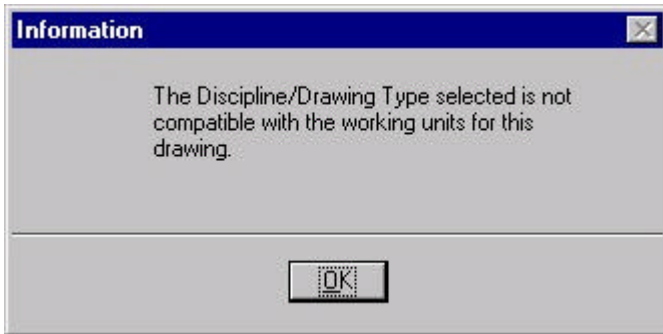The working units where originally set to feet and inches with a resolution of 12 and 8000. This is not acceptable working units for a civil/site design file. Then intent of this exercise is to work with the existing data and not to change or recreate the entire design.

4. Select *Ok*

5. Pick the *General Information* icon from the Details toolbox

6. Select *Witness/extension lines, dimension arrowheads/dots/slashes, dimension text* from the layerbox

7. Select the *place text* command from the *Witness/extension lines, dimension arrowheads/dots/slashes, dimension text* toolbox

    Dimensions are placed using the *active text height*, therefore it will be necessary to select this command first to adjust the dimension size.

8. Select the *place dimension* command from the *Witness/extension lines, dimension arrowheads/dots/slashes, dimension text* toolbox

9. Place the 65 foot dimension into the design file

    Notice that the dimension size is incorrect. This is just the first noticeable problem with this dimension. In this non-compliant drawing, it will be necessary to create matching elements to the existing data and ignore the non-compliance.

10. Using the *SmartMatch* command in MicroStation select the existing dimension text

    This will adjust the active settings, not change the dimension you placed.

11. Change the new dimension to match the old with the *Update Dimension* command

    This should produce acceptable results

Your design should look like the following:
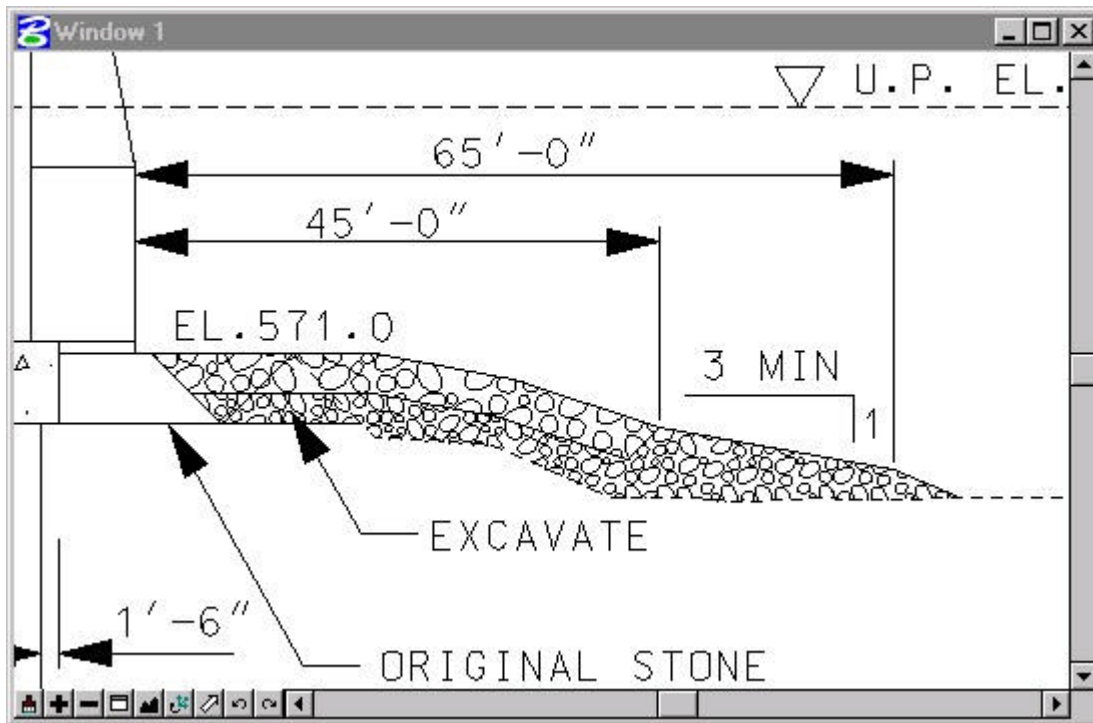
Adding a Note

In this next section we will place a note into the design file.

1. Zoom into the area of patterning on the left side of the design

2. From the Details toolbox select the *General Information* icon

3. Select *Detail title text, text and associated leader* from the layerbox
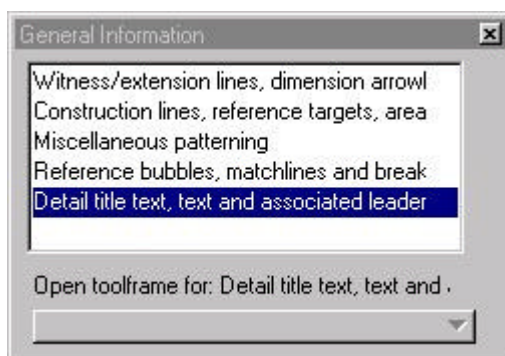
4. Pick the *place note* command from the *Detail title text, text and associated leader* toolbox

5. Keyin *ORIGINAL STONE PROTECTION* into the text editor

6. Place the note into the design

Your drawing should look like the following:
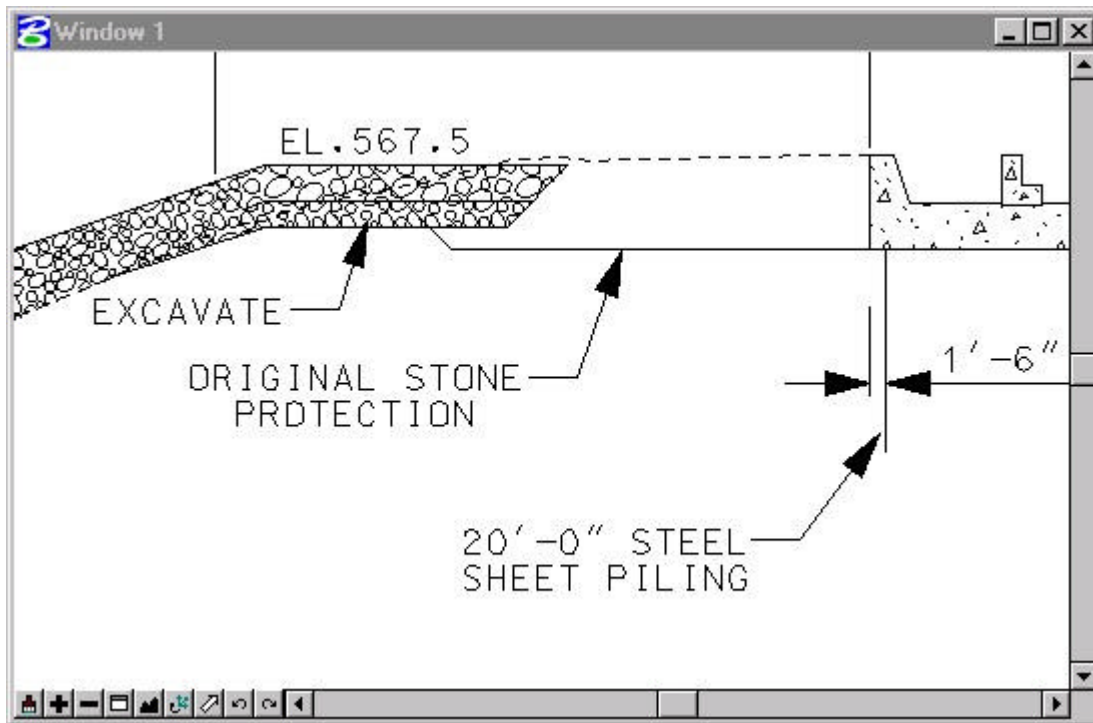
[Instructor – This file does not use the standard working units, therefore scales of text and dimensions may not be the correct size when placed. Use a combination of matching or resetting the drawing scale.]

Exercise 5-3: Creating Civil/Site Sheet Files

In this exercise we will create a new compliant sheet file with reference files that are not compliant. The model files have various working units that will require scaling.

The completed sheet file should look like the following:
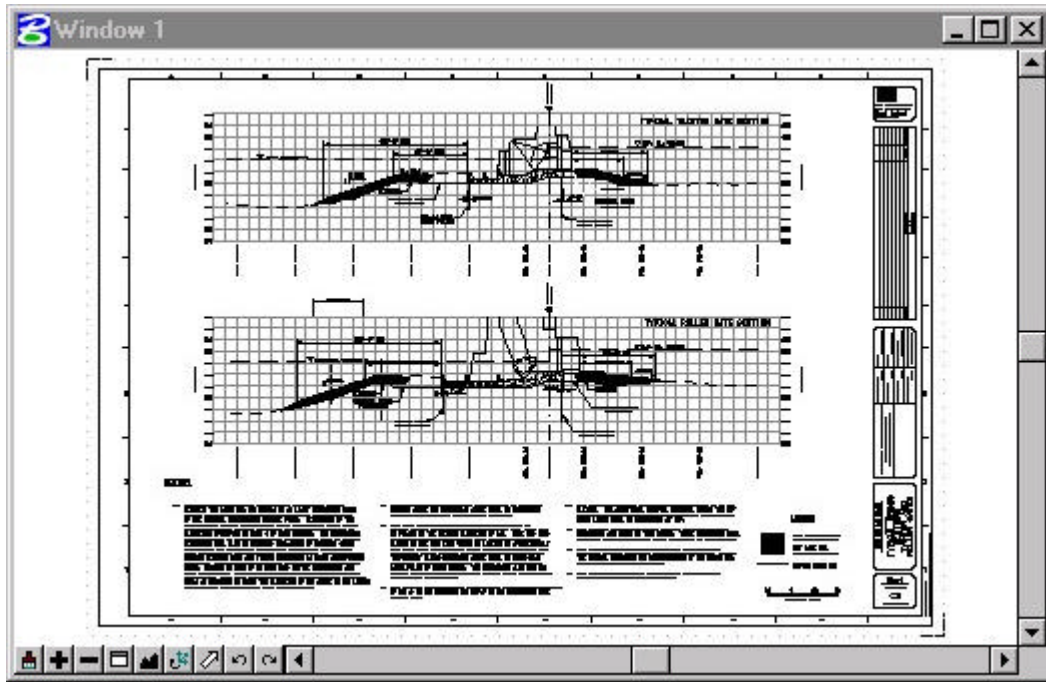
Create a New Sheet File

In this next section we will create a sheet file. For this sheet file we will be using a metric seed to match the model file working units.

1. Start MicroStation

2. Open the *create design file* menu (File>New)

3. From the bottom of the dialog box in the *Seed File* section, pick *Select*.

    This will open the *Select Seed File* dialog box.

4. From the TSWS/seed directory select the file M_CIV_2D.DGN from the list

    This will use the Imperial units of ft and resolution set to 100 and 10.

5. Select *OK*

6. Keyin a compliant name for a civil/site sheet file

7. Select *OK* to create the file

8. Select *OK* to open the file

Attaching the model files

Once we have the sheet file created we need to attach all of the model files used for this sheet file. The model files used for this sheet file include:

- B6AGBS01.DGN
- B6ACDT01.DGN
- B6ACDT02.DGN
- B6ACDT03.DGN

1. Open the *Reference File* menu (*File>Reference*)

2. Open the *attach reference file* dialog menu (*Tools>Attach*)

3. Navigate to the class directory and select one of the reference files.

4. Select *OK*

5. Keyin a logical name in the *Attach Reference File* dialog box

6. Keyin a description in the *Attach Reference File* dialog box

7. Verify that the Nest Depth is set to 0

    A nest depth of greater that 0 will result in any reference file that is attached to the file will also be attached as a separate reference file attachment. This is not usually the desired result.

8. Select *OK*

9. Use the *Fit* command to view the reference file

10. Place a fence around the area to be used

11. From the Reference Files dialog box select the *Clip Boundary* command (*Tools>Clip Boundary*)

    Repeat these steps to attach all of the model files listed above

Move and Scale Model Files

1. Scale the border model file to fit around the design

2. Move reference files to the proper locations

3. Create clip boundaries where needed

4. Adjust reference file levels where needed

This completes the Civil/Site chapter. More Civil/Site exercises can be found in Chapter 6.

6 Checker Dialog Box

Standards Checker

This chapter is designed to familiarize the user with the Standards Checker. We will examine the checker interface and interpret the output results in the checker report.

The checker is a process that is intended to give the user feedback on how compliant the design files are to the Tri-Services Standards. The checker is automatically executed upon startup of any MicroStation design file.

Exercise 6-1: Using the Checker Dialog Box

In this exercise we will open an Architectural model file and work through the interface of the checker.

Using Locate

1. Start MicroStation

2. Open the file FWAAFP01.DGN from the class directory

   This design file is a large floor plan. It is a compliant drawing with a few non-compliant elements placed inside.

[Instructor – The checker can be disabled modifying the file tswsck.cfg. This file can be found in the …/ustation/config/system/ directory.]
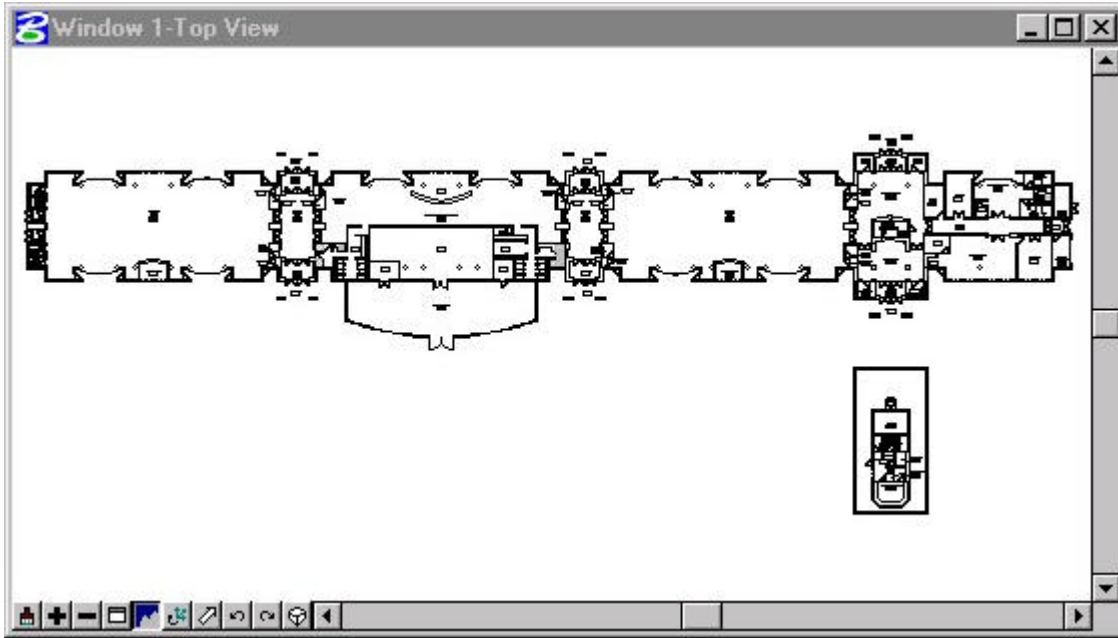
3. From the TSWS pull-down menu, select the checker (*TSWS>Checker Dialog*)

   This will open the checker dialog box.
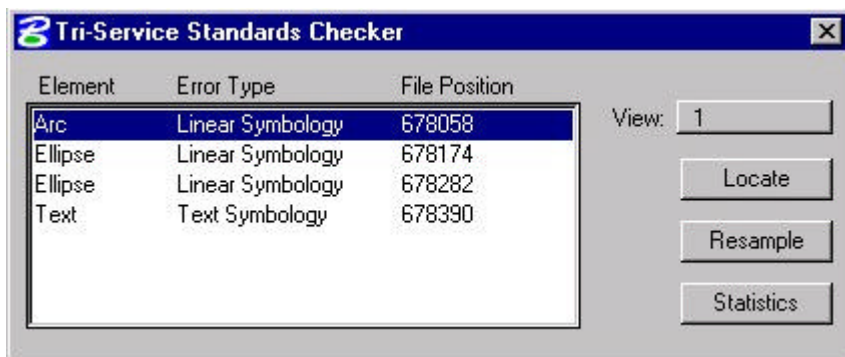
   Notice the four (4) elements that are listed inside of the Tri-Services Standards Checker dialog box. The three (3) columns in the dialog box have information about the elements that are found not to be in compliance. The first column is the type of element (Arc, Ellipse and Text). The second column lists the type of error that the checker found (Linear Symbology and Text Symbology). The last column is a listing of the File Position. File Position is usually ignored, but can sometimes be used to locate corrupt elements.

4. Verify that the view number listed at the top right matches the view you have open.

   When using the *Locate* command, MicroStation will zoom around the selected element in the view listed.

5. Select the first element in the list.

This will be the Arc

6. Select *Locate*

MicroStation will now zoom into the area around the Arc and highlight the Arc element.
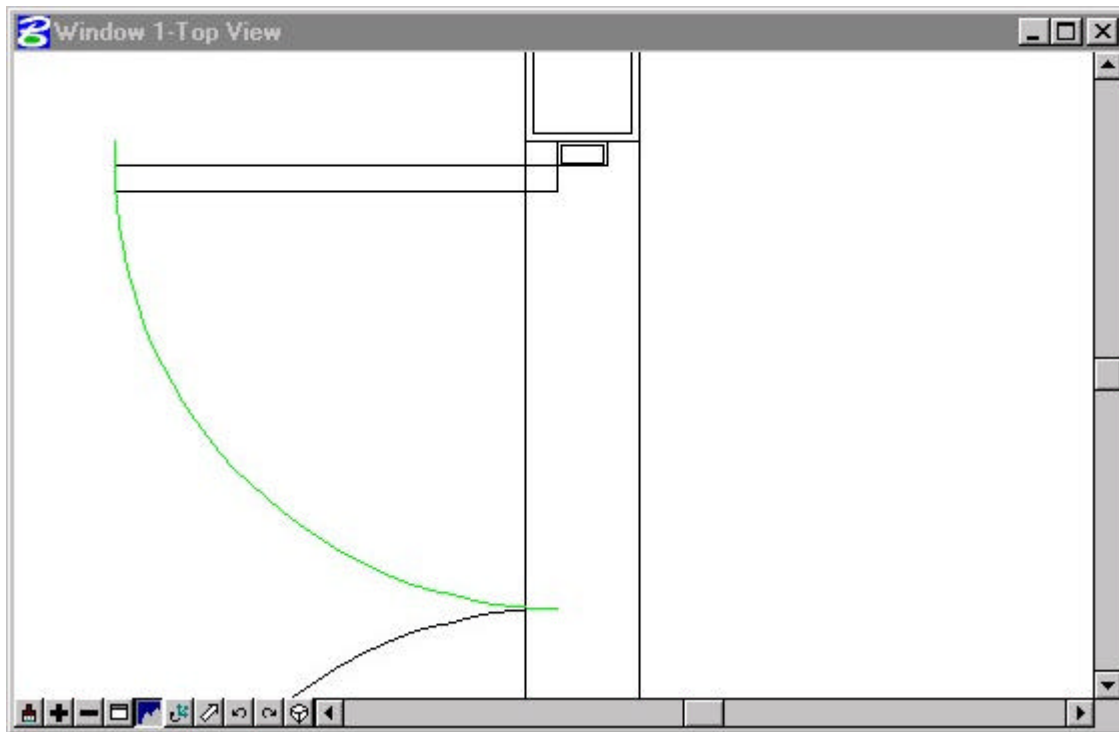
7. Repeat the process of locating each element in the list

Using Statistics

In this section we will check the statistics for the design file, make a change to a non-compliant element and recheck the statistics.

1. From the TSWS pull-down menu, select the *checker* (*TSWS>Checker Dialog*)

2. From the *Checker* Dialog, select *Statistics*

You should see the following information box:

☞ The Elapsed time will be different each time the statistics are displayed.

3. Select *OK*

Changing Elements and Resample

1. Select the first element in the list.

   This will be the Arc used in a door

2. Select *Locate*

3. Open the *Architectural Floor Plan* toolbox (*TSWS>Architectural>Floor Plan*)

4. Select the *doors* icon

5. From the Layerbox, select *Full height (to ceiling) door: swing and leaf*

   This will change the active symbology inside of MicroStation
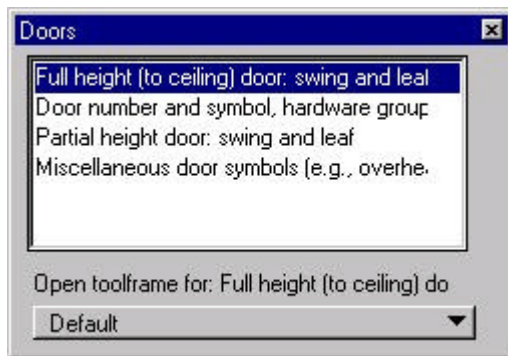
6. Using the *Change Element Attribute* command, modify the symbology of the Arcs symbology

7. Select *Statistics* from the checker dialog box
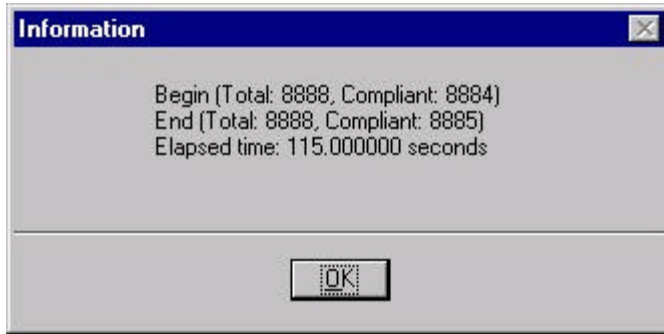
This time the statistics reflect the change in compliant element total.

8. Select *Resample*

    This will update the listing in the checker dialog box to reflect the new status of the drawing file. Both the *Statistics* and *Resample* force the checker to re-check. On very large drawings or slower machines it may be necessary to avoid selecting these commands repetitively.
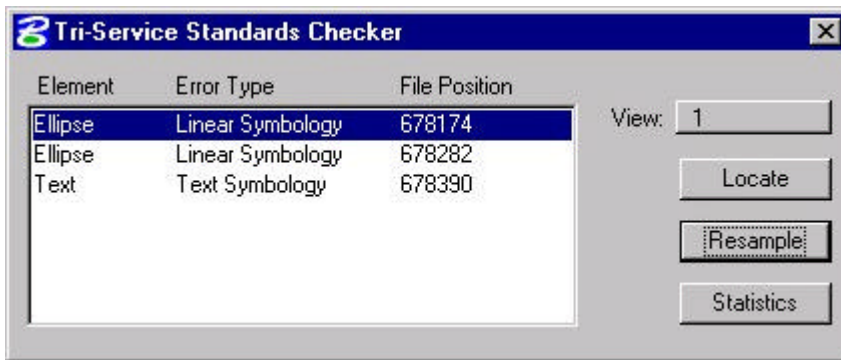
Change the Symbology of the Two Non-Compliant Ellipses

1. Use the *Locate* on the *Checker* dialog box to find the ellipses

    Circles are displayed as an ellipse internally to MicroStation.

2. Select the *Columns* icon from the *Architectural Floor Plan* toolbox

3. From the Layerbox, select *Column enclosures/fire protection*

    This will adjust the active symbology to the proper settings

4. Using the *Change Element Attribute* command, modify the symbology of the column symbology

5. Verify the compliance by using the *Resample* command inside of the Tri-Services Checker dialog box.

Change the Symbology of the Non-Compliant Text

The last non-compliant element is a text string. When changing text elements it may be necessary to use two (2) commands. The first, to change level, color, style and weight with the *Change Element Attribute* command. The second would be *Change Text Attributes* command to change attributes such as font.

1. Open the Architectural Floor Plan toolbox (*TSWS>Architectural>Floor Plan*)

2. Select the *Floor information* icon

3. From the Layerbox, select *Room name, space identification text*

    This will change the active text symbology inside of MicroStation
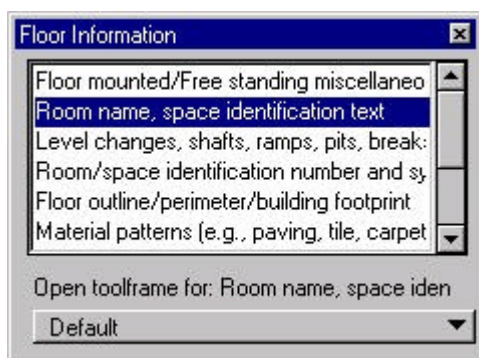
Statistics and Resample

At this point in the design file we should be able to Resample the floor plan and also check statistics to find a completely compliant design file.

After doing a Resample there should be no elements listed in the Tri-Services Checker dialog box.
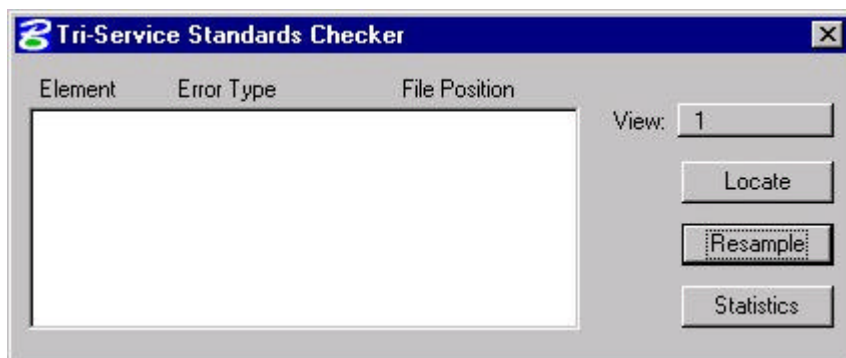
Statistics should reveal 8888 total elements and 8888 compliant elements
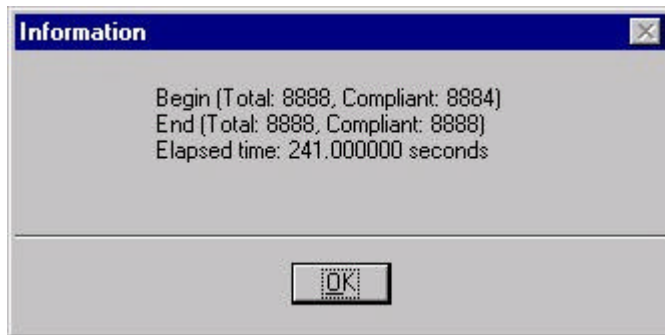
Exercise 6-2: Checking an Existing Civil/Site Model File

In the following Civil/Site Grading Plan we will change non-compliant elements to be compliant. Less detail will be give during this exercise than with lesson 6-1. The final outcome of this exercise should be a 100% compliant drawing.
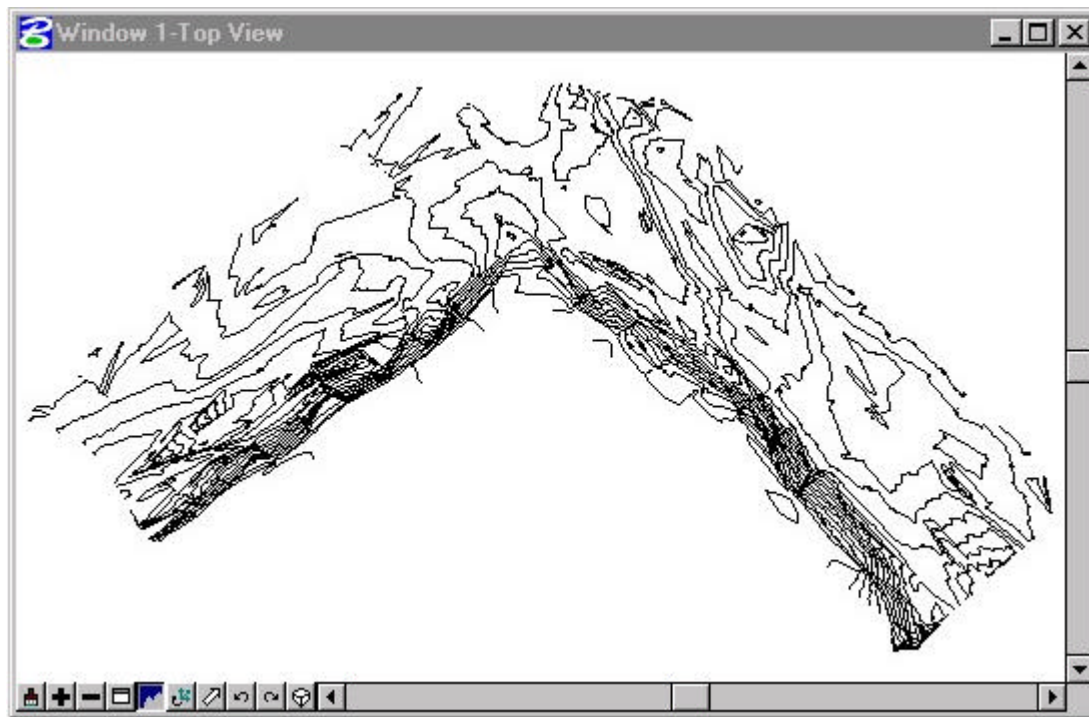
1. Start MicroStation

2. Open the file EJACGP01.DGN from the class directory

    This design file is a Grading Plan. It is a compliant drawing with a few non-compliant elements placed inside.

3. Open the *Civil/Site Grading Plan* toolbox (*TSWS>Civil/Site>Grading Plan*)

4. Select the *Topography* icon

5. From the Layerbox, use the Major contours and Minor contours to make the non-compliant elements compliant

    Selecting these options will change the active symbology inside of MicroStation
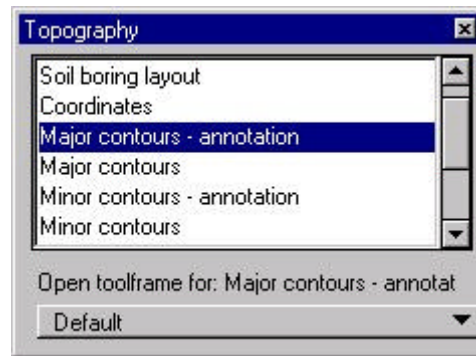
6. Using the *Change Element Attribute* and *Modify Text* commands modify the symbology of the non-compliant elements

The final results should be a 100% compliant drawing.

Exercise 6-3: Troubleshooting Design Files

In the following exercise we will open the design file CCAXLP01.DGN and change the non-compliant elements to be compliant.
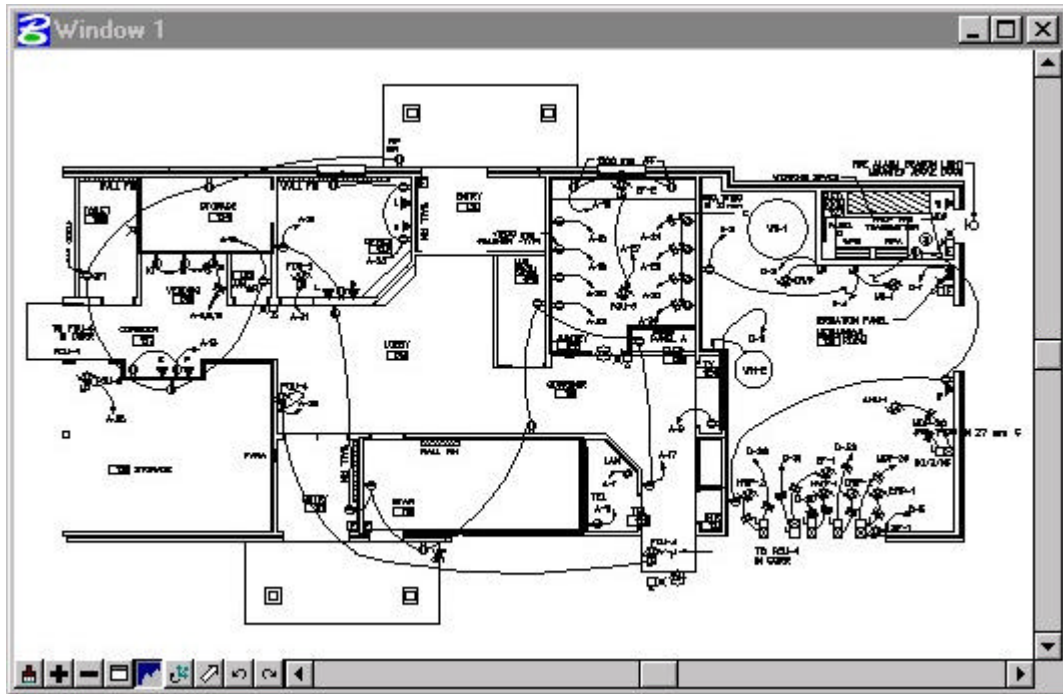
Notes: *[Instructor – The following is information needed to make the drawing compliant.]*

Drawing Name is not compliant. Student should do a save-as to create a drawing name based on the discipline and drawing type. This will also require an exit and restart of MicroStation.

Try not to give the students too many hints. We want them to think on their own.

Discipline = Electrical
Drawing Type = Power Plan
Level to be turned on = 22
Highlight color

Exercise 6-4: Troubleshooting Design Files

In the following exercise we will open the design file B6AEDT01.DGN and change the non-compliant element to be compliant.
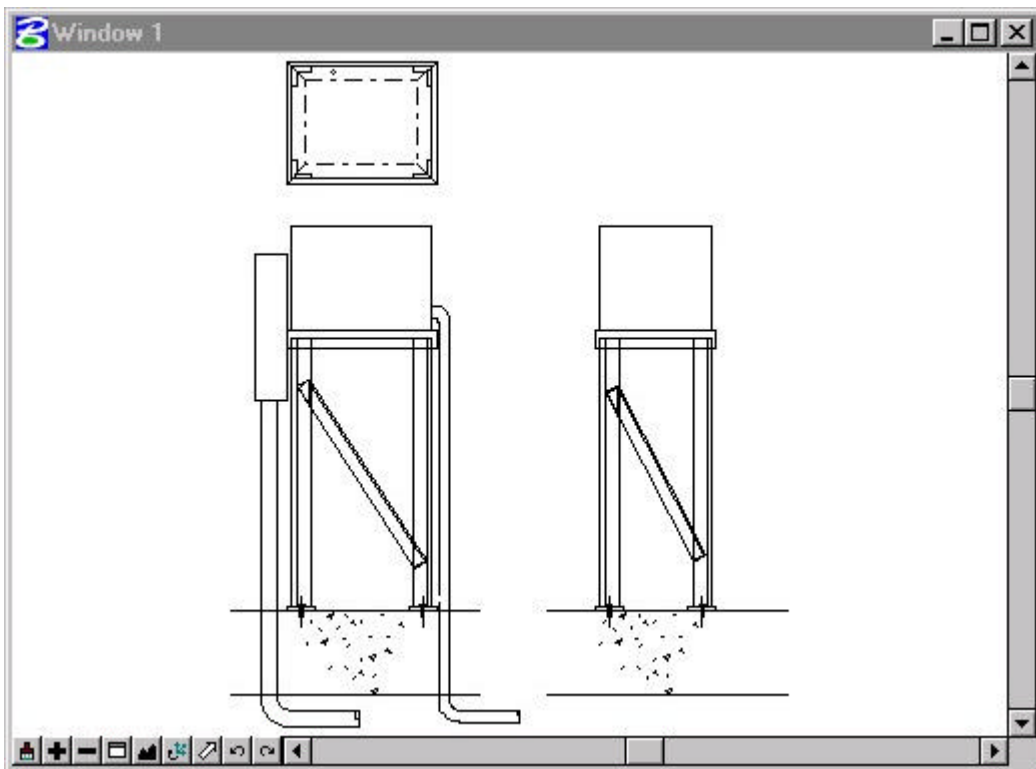
Notes: [*Instructor – The following is information needed to make the drawing compliant.*]

Drawing Name is compliant.

Try not to give the students too many hints. We want them to think on their own.

Discipline = Electrical
Drawing Type = Detail
The Non-Compliant element is a construction element with construction view attributes turned off.

A

Quick Naming Guide

Electronic Drawing File Naming Conventions

Naming conventions for electronic drawing files (both model files and sheet files) allow CADD users to determine the contents of a drawing without actually displaying the file. They also provide a convenient and clear structure for organizing drawing files within project directories. The standard naming conventions provided within this manual are based on the eight-character file name limitation of the DOS operating system. To accommodate the more common conventions currently used within the DoD Tri-Services, this manual provides two (2) acceptable file naming methodologies. These methodologies are the Industry Standard and Tri-Service Optional.

☞ Most current operating systems allow for file names longer than eight (8) characters. However, some file transfer methods (e.g., CD-ROM writers, e-mail) are not able to handle long file names and will truncate the name down to eight-characters. Therefore, this standard will continue to promote eight-character file names until this limitation is resolved.

☞ The Industry Standard file naming conventions are those developed by the AIA (model file naming) and CSI (sheet file naming) as part of the National CADD Standards Initiative.

TABLE 1
Industry Standard Sheet Type Codes/Designators

Drawing Type	Characters
General (symbols, legend, notes, etc.)	0
Plans (horizontal views)	1
Elevations (vertical views)	2
Sections (sectional views)	3
Large Scale (plans, elevations, or sections that are not details)	4
Details	5
Schedules and Diagrams	6
User Defined	7
User Defined	8
3D Views (isometrics, perspectives, photographs)	9

Note: CSI's "Uniform Drawing System" document (Appendix A, UDS-01.35-.41) contains two (2) levels for designating the discipline code/designator based on the complexity of the project. The simplest level, Level One (which is presented here), has the second character being filled by a hyphen (-). Examples would be: Architectural (A-), Electrical (E-), etc. For very complex projects with the possibility of hundreds of sheet files within disciplines, the Level Two discipline codes/designators have the second character filled with a discipline modifier (e.g., Landscape Demolition (LD), Landscape Irrigation (LI), Landscape Planting (LP)). For more information on this topic, please see the UDS document.

The Industry Standard file naming methodology relies solely on directory structure to differentiate individual projects (i.e., all the design files for a particular project are in a directory with the project's name). Some system administrators find this method inadvisable because it permits the same file name to exist in different directories. The possibility of overwriting files with identical names is a constant problem. Figure 7 shows a typical file structure for this method.

☞ Some CD-ROM writing utilities do not recognize a hyphen ("-") as a legal file name character. For these utilities, use either an underscore ("-") for the hyphen or utilize the Tri-Services optional file naming conventions.

Tri-Services Optional Model File Naming Convention

In the Tri-Services Optional model file naming convention, the first three (3) characters of the file name are the Project Code. Project codes are developed by the user and are not standardized. The fourth character represents the Discipline Code/Designator (see Table 2, Note: This table includes disciplines not covered by AIA of CSI, such as Civil Works and Geotechnical). The fifth and sixth characters designate the Drawing Type Code (See Table 3 which includes a sample of these codes, for a full listing see Appendix D. Note: This table includes drawing type codes not covered by AIA or CSI). The remaining two (2) characters are user-definable.

TABLE 2 Tri-Services Optional Discipline	
Discipline	**Character**
General	G*
Survey and Mapping	V
HTRW/Environmental	H*
Civil/Site	C*
Civil Works	W
Geotechnical	B
Utilities	U
Landscape Architecture	L*
Structural	S*
Architectural	A*
Interior Design	I*
Equipment	Q*
Fire Protection/Suppression	F*
Plumbing	P*
Mechanical	M*
Electrical	E*
Telecommunications	T*
Resource	R*
Other Disciplines	X*
Facility Management	N
Contractor/Shop Drawings	Z*
*denotes AIA compliant	

Tri-Services Optional Sheet File Naming Convention

In the Tri-Services Optional sheet file naming convention the first three (3) characters of the file name are the Project Code. Project codes are developed by the user and are not standardized. The fourth character represents the Discipline Code/Designator (see Table 2) and the fifth character defines the sheet type designator (see Table 1). The sixth and seventh characters designate the Sheet Sequence Number (01-99). The remaining character is user-definable.

Example: The sheet file for the first page of a set of Mechanical HVAC Plans for project number "B6A" would be:

B6AM101.dgn

Example: For a building that has multiple floors the Architectural Demolition Plan sheet file name for Sheet 1, Floor 2 would be:

B6AA1012.dgn

Coordination Between Sheet File name and Sheet Identifier

In assigning a sheet identifier (for use in the sheet identification block, reference bubbles, etc.), the user should coordinate with the name assigned to the electronic sheet file. The sheet identifier should consist of the discipline code/designator, sheet type designator, and the sheet sequence identifier/ number. This sheet sequence identifier/number. This sheet identifier convention is compatible with both the Industry Standard and the Tri-Service Optional sheet file naming conventions.

TABLE 3 Tri- Services Drawing Type Codes		
Discipline	**Code**	**Definition**
General (G)		
	BS	Border Sheet
	KP	Keyplan
Surveying and Mapping (V)		
	3D*	Isometric/3D
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP8	Enlarged Plan
	SC*	Section
	SP	Survey/Mapping Plan
HTRW/Environmental (H)		
	3D*	Isometric/3D
	AB	Asbestos Sample Location
	DD	Demolition Basin Detail
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	ED	Evapotranspiration Bed detail
	EL*	Elevation
	EP*	Enlarged Plan
	EV	Environmental Plan
	FD	Leachate Field Detail
	GC	Gas Collection System Detail
	GD	Ground Storage Reservoir Detail
	HP	Hydraulic Profile
	LC	Leachate Collection Detail
	LD	Lift Station Detail
	LF	Landfill Liner and Cover Detail
	LP	Lead Paint Sample Location
	OD	Oil Water Separator Detail
	PP	Pollution Prevention Plan

TABLE 3 Tri- Services Drawing Type Codes		(Continued)
Discipline	**Code**	**Definition**
	QP*	Equipment Plan
	SC*	Section
	SD	Spill containment Detail
	ST	Septic Tank Detail
	WD	Water Supply Building Detail
	WP	Water Treatment Plan
	WT	Elevated Water Tank Detail
	WW	Wastewater Treatment Plan
Civil/Site (C)		
	3D*	Isometric/3D
	AF	Airfield Plan
	AI	Airfield Paving Plan
	AP	Apron Striping Plan
	BL	Boring Location
	CP	Channel Plan
	CS	Cross Section
	DD	Storm Drainage Detail
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	DU	Utility Detail
	EC	Erosion Control Detail
	EL*	Elevation
	EP*	Enlarged Plan
	FD	Fence Detail
	GP*	Grading Plan
	IP	Installation Plan
	JD	Joint Detail
	JE	Joint Elevation Plan
	JP	Joint Layout Plan
	KP	Staking Plan
	LD	Lift Station Detail
	LP	Layout Plan
	OD	Oil Water Separator Detail
	PD	Pavement Detail
	PI	Piping Plan
	PL	Project Location Map

TABLE 3		(Continued)
Tri- Services Drawing Type Codes		
Discipline	**Code**	**Definition**
	PM	Pavement Marking Plan
	PV	Pavement Plan
	QP	Equipment Plan
	RP*	Road Plan
	SC*	Section
	SM	Sanitary Manhole Detail
	SP*	Site Plan
	SR	Sanitary Sewer Plan
	SS	Sanitary Sewer Plan
	SV*	Survey Plan
	TP	Topography Plan
	TS	Transportation Site Plan
	TX	Topography Plan – Demolition
	UP*	Utility Plan
	WD	Water Detail
	WP	Water Line Profile
Civil Works (W)		
	3D*	Isometric/3D
	CP	Civil Works Plan
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	QP*	Equipment Plan
	SC*	Section
Geotechnical (B)		
	3D*	Isometric/3D
	BL	Boring Location
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	LB	Boring Log
	QP*	Equipment Plan
	SA	Stability Access
	SC*	Section
	SP	Soil Profile
Utilities (U)		
	3D*	Isometric/3D
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EC	ECMS Plan
	EL*	Elevation
	EP*	Enlarged Plan
	EU	Electrical Utilities Plan
	FU	Electrical Utilities Plan
	GA	Gas Utilities Plan
	GE	General

TABLE 3		(Continued)
Tri- Services Drawing Type Codes		
Discipline	**Code**	**Definition**
	HT	HTCW Utilities Plan
	QP*	Equipment Plan
	SC*	Section
	WA	Domestic Water Plan
Landscape Architecture (L)		
	3D*	Isometric/3D
	AD	Arbor Detail
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	IP	Irrigation Plan
	LP	Landscape Plan
	QP*	Equipment Plan
	SC*	Section
	TP	Turing Plan
Structural (S)		
	3D*	Isometric/3D
	CP	Column Plan
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	FD	Foundation Detail
	FP	Foundation Plan
	FS	Foundation Section
	JL	Joist Girder Load Diagram
	MD	Masonry Detail
	PP	Precast Panel Layout Plan
	QP*	Equipment Plan
	RD	Roof Framing Detail
	RF	Roof Framing Plan
	RP	Reinforcement Plan
	RS	Roof Framing Section
	SC*	Section
	SF	Stair Framing Plan
	TB	Truss Bracing Plan
	TE	Truss Elevation
	WG	Wind Girt Elevation
Architectural (A)		
	3D*	Isometric/3D
	AC	Area Calculations
	BE	Building Elevation
	BS	Building Section
	CP*	Reflective Ceiling Plan
	CW	Casework Detail
	DD	Door Detail
	DG*	Diagram
	DP*	Demolition Plan

TABLE 3		(Continued)
Tri- Services Drawing Type Codes		
Discipline	**Code**	**Definition**
	DT*	Detail
	ED	Exterior Detail
	EL*	Elevation
	EP*	Enlarged Plan
	FP*	Floor Plan
	IE	Interior Elevation
	KP	Key Plan
	LS	Life Safety Plan
	NP*	Finish Plan
	QP*	Equipment Plan
	RP	Roof Plan
	SC*	Section
	WD	Window Detail
	WS	Wall Section
Interior Design (1)		
	3D*	Isometric/3D
	AP	Artwork Placement Plan
	CP*	Ceiling Plan
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	NP*	Finish Plan
	QP*	Equipment Plan
	RP*	Furniture Plan
	SC*	Section
	SD	Signage Detail
	SP	Signage Placement Plan
	WP	System/Prewired Workstation Plan
	WT	System/Prewired Workstation Typical
Equipment (Q)		
	3D*	Isometric/3D
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	KP	Kitchen Plan
	QP*	Equipment Plan
	SC*	Section
	SP	Security Plan
Fire Protection/Suppression (F)		
	3D*	Isometric/3D
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail

TABLE 3		(Continued)
Tri- Services Drawing Type Codes		
Discipline	**Code**	**Definition**
	EL*	Elevation
	EP*	Enlarged Plan
	FS	Fire Suppression Plan
	KP*	Sprinkler Plan
	QP*	Equipment Plan
	SC*	Section
	VP*	Evacuation Plan
Plumbing (P)		
	3D*	Isometric/3D
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	PP*	Plumbing Plan
	PR	Plumbing Riser Diagram
Mechanical (M)		
	3D*	Isometric/3D
	CD	Control Detail
	CP*	Control Plan
	SC	Control Schematic
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EM	EMCS Plan
	EP*	Enlarged Plan
	HC	HVAC Condense Riser Diagram
	HD	HVAC Detail
	HP*	HVAC Ductwork Plan
	HR	HVAC Demolition
	HX	HVAC Demolition Plan
	MH	Material Handling Plan
	PP*	Piping Plan
	QP*	Equipment Plan
	SC*	Section
	SP	Specialty Piping Plan
Electrical (E)		
	3D*	Isometric/3D
	AP	Auxiliary Power Plan
	CP*	Communication Plan
	CR	Communication Riser
	CX	Communication Demolition Plan
	DG*	Diagram
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	GP*	Grounding Plan
	LD	Lighting Fixture Detail

TABLE 3		(Continued)
Tri- Services Drawing Type Codes		
Discipline	**Code**	**Definition**
	LP*	Lighting Plan
	LR	Lighting Protection Plan
	LX	Lighting Plan- Demolition
	PP*	Power Plan
	PR	Power Riser
	PX	Power Plan – Demolition
	QP*	Equipment Plan
	SC*	Section
Telecom- munications (T)		
	3D*	Isometric/3D
	CD	Communication System Plan
	DG*	Diagram
	DA*	Data Plan
	DP*	Demolition Plan
	DT*	Detail
	EL*	Elevation
	EP*	Enlarged Plan
	QP*	Equipment Plan
	SC*	Section
	TP*	Telephone Plan

- Denotes AIA compliant

Model File Name

B6AELD01.DGN

B6A	Project Code
E	Discipline Code – Table 2
LD	Drawing Type – Table 3
01	User Definable
.DGN	Drawing Extension

Sheet File Name

B6AA101X.DGN

B6A	Project Code
A	Discipline Code – Table 2
1	Sheet Type – Table 1
01	Sheet Sequence
X	User Definable
.DGN	Drawing Extension